SUBJECT INDEX

Aberdeen, Wash.; consumption and financial data, 1158 Accounting; 1152, 1164 cost keeping; 30, 277, seq., 554, 558, 1129 work orders and, 278 customer; machines and, 387 seq., stub plan; 692 advantages, 698 depreciation and, 1154 interest during construction and: 1970 Federal Income Tax Law and, 1973 Interstate Commerce Commission and, 1971 National Assocn. of Railway and Utility Commissioners and, 1972 practice, 27 seq., 553 classification uniform and. seq. see Materials Addressograph; customer accounting and, 389, 693 Administration; 1119 commission and, 24 municipally owned works, independent department and, 23 political interference and, 22 seq. water district and, 809 Aeration; Aer-O-Mix and, 1168, 1413 air-lift pumping and, 1413, 1547 in aqueduct, 1412 bibliography, 72, 1414 cascade and, 1413 coke trays and; 717, 889, 1413, 1548 head used, 1548 diffused; 658, 686, 1173, 1200, 1201, 1405, 1413, 1434 cost, 689 orifice spacing and, 71 double, 1412, 1767 efficiency; bubble vs. water fall types, 66 seq., 69 seq. contact surface and time, 69 factors, 68 seq. temperature and, 68

esthetic effect, 1412 free fall and, 1413

perforated pan and, 1413 plants employing, list, 1192 riffle plates and, 1412, 1413 splash, 1403 spray; 93, 210, 1114, 1195, 1199, 1403, 1407, 1412, 1767 head required, 71 nozzles, Sacramento type, 339 under pressure, Elgin process, 1403, 1406, 1414 winter operation, 1430 status, 1401 steps and, 1004, 1413 storage in open basin and, 69 theory, 64 seq trickling devices and, 1413 type; practice, 72 selection, 68 seg water fall and, 1197 see Air; Carbon dioxide removal; Chlorination, taste and odor; Coagulation; Corrosiveness; De-chlorination; Gases; Hydrogen sulfide removal; Iron removal; Manganese removal; Microscopic organisms; Mixing; Odor; Oxygen dissolved; Taste and odor; Temperature Aerial mapping; accuracy, 406, 409, 411 method, 406 water surveys and, 397 Aer-O-Mix; see Aeration Agitation; see Mixing; Softening Agra, India; filtration and, 18 Air; solution, rate of; 64 seq. bubble vs. waterfall aeration and, 66 seq. formula, 65 moist vs. dry air and, 67 movement of water and, 67 see Aeration; Gases Air lift; see Well pumping Akron, O.; purification plant data, 1190 Alabama Water Service Co.; distribution system maps and records, 1922 pressure complaints, handling, 1835 Albany, N. Y.; Alcove Reservoir, design, safety factor and, 528

coagulation, mixing and conditioning and, 1428

corrosiveness, aeration and, 1406 filters, water level control device, 1552

purification plant data, 1190 supply conduit, new, 366

turbidity determination, superimposed cover glass slide method, 1422

typhoid epidemic, 1782 Algae; see Microscopic

Alkalinity; caustic; B. coli and, 1057 increase, algae and, 107

free carbon dioxide and pH, relationship; 992 equation and nomogram, 560

see Calcium carbonate; H-ion concentration

Alkalinity determination; see Boiler water

Altoona, Ger.; filtration, 20

Aluminum sulfate; manufacture, at water works, savings and, 538 see Coagulation

American Cast Iron Pipe Co.; cement-lined pipe, tar coating and, 1865

American Enka Corporation; reservoir, manganese and iron and; 425 treatment methods and, 429

American Gas Association; pipe joint studies, 1812

American Standards Association; cast iron pipe specifications, sectional committee report, 562

cement mortar lining for cast iron pipe and fittings, proposed American tentative standard, 564 function of, 869

American Water Works Association; annual convention, 2025

committee; on cost records, proposed, 1563 on filtering materials, report,

n nite

on immediate water works betterments for unemployment relief, report, 436

on taste and odor control, report, 1738

Diven Memorial Medal award, 2026 John M. Goodell award, 2026

Standard Methods for the Examination of Water and Sewage, statement re, 1609

see Central States Section; Committee report; Minnesota Section; Society affairs; etc.

American Water Works and Electric Co.; stores distribution and inventory, 1873

taste measurement method, 1742 Ammonia; application, apparatus for, 272

see Chlorination; Taste and odor Ammonia, albuminoid; -free ammonia ratio, significance, 134

Ammonia, free; as pollution indicator,

Amsterdam, Holland; manganese removal, 19

Anabaena; cattle poisoning and, 104 discoloration of water and, 104 temperature and, 100

Anthrax; water-borne, possibility of, 1312

see Bact. anthracis

Aqueduct; aeration and, 1412 ancient, 530

route, aerial mapping and, 398 Arizona; Boulder Dam case, 1666 seq.

Asterionella; odor and, 1409

Atlanta, Ga.; delinquents, shut-off and, 1848

water; iodine content, 109 purification; 106 seq. plant data, 1190

plant data, 1190 quality, 105 seq., 109 Auburn, N. Y.; customer accounting, 387

leakage, pavement undermining and, 1885

Bacteria; ammonia, free, and, relationship, 134

chlorides and, relationship, 135 count, sample age and storage temperature and, 895

mussels, fresh-water, and, 572 see Chlorination; Filtration; Sterilization; Storage; etc.

Bacteria, anaerobes; see Bacterium coli test

Bacteria, cellulose-digesting; media for, 1064

Bacteria, colon group; differentiation; bibliography, 894

cellobiose and, correlation with methyl red, Voges-Proskauer, citrate, uric acid and sucrose, 891

citrate test, 1271

ferric ammonium citrate vs. methyl red—Voges-Proskauer, 1271

plate count, ferrocyanide citrate agar; 1270 correlation; with other tests. with sanitary survey, 1273

tests, correlation; 1272 with sanitary survey, 891 jute pipe joint packing and, 1062, 1783

leather washers and, 1062 pump packing and, 1062, 1783 see Bacteria, lactose-fermenting;

Bacterium aerogenes; Bacterium coli

ric

n.

n-

e-

04

f,

ff

Bacteria, lactose-fermenting; cultivation, prolonged, uniform reactions and, 421

see Bacteria, colon group; Bacterium aerogenes; Bacterium coli Bacteria, manganese-depositing; cultural characteristics, 84 seq.

isolation, 82 seq.

in waters; manganese content and,

of Texas, 78 seq.

see Manganese

Bacteria, spore-forming; see Bacterium coli test

Bacteria, sulfur; hydrogen sulfide and; 63

production in distribution system and, 1793

Bacteriological examination; see Bacteria; Bacteria, colon group; Bacterium coli test

Bacterium aerogenes; -B. coli ratio; in human and animal feces, 1269

in soils and grains, 1271 cotton rope and, 1063

food poisoning outbreak and, 1277, 1280

H-ion concentration and gas production in sugar broths, 1052

stumps, longevity; in decayed presence of B. coli and, 1271 in stored sewage, compared with B. coli, 1270

significance, 1269

in soils and grains, source of in, 1275

in swimming pool water, significance, 1277

see Bacteria, colon group; Bacteria, lactose-fermenting; Bacterium coli

Bacterium anthracis, spores; longevity in soil, 1312

in water, storage and, 1312 Bacterium coti; alkalinity, caustic, and, 1057

-B. aerogenes ratio; in human and animal feces, 1269

in soils and grains, 1271 chlorine and; pH and, 1054

resistant strains and, 1061, 1062 distilled water, toxicity and, 1055 H-ion concentration and gas pro-duction in sugar broths, 1052

longevity; in decayed stumps, presence of B. aerogenes and, 1271 in stored sewage, compared with B. aerogenes, 1270

in main sediment, 1841 multiplication in water; 572 fresh-water mussels and, 573 Ps. fluorescens, masking by, 421 pyocyaneus, overgrowth and,

421 quality standard and; 138 Treasury Dept. and, 1284

significance, 138, 1269 see Bacteria, colon group; Bacteria, Bacterium lactose-fermenting;

aerogenes Bacterium coli test; anaerobes, crystal violet, malachite green and brilliant green bile and, 1052

bibliography, 423, 1051, 1274

brilliant green bile, spore-formers and, 1031 confirmation; brilliant green bile

and, 1031, 1040, 1045, 1048, 1305 Endo medium containing lactose and dextrose, comparison, 420 subculturing on successive days and, 420

dilution tube method, interpretation, 1046

esculin test, value of, 1274 frequency and, importance, 1043 index, calculation, 415

plate count, ferrocyanide citrate agar; 1270

colony types and interpretation, 1272, 1277

presumptive; B. coli-B. aerogenes ratio before and after incubation, 1269

bile and; 1029, 1268 inhibition and; 1029 concentration and, 1030 spore-formers and, 1030

brilliant green bile and; 413, 1029 buffering and, 1031 Cl. welchii and, 1276 composition and, 1031 seq. H-ion concentration and, 1031

and lactose broth; comparison, 1029

Dominick-Lauter and broth, comparison, 1305 parallel planting and; 1031 interpretation, 1034 dextrose broth and, 1268 Dominick-Lauter broth and, 413, 1052, 1274 dye-containing media and, 1268 fuchsin broth and; 413 confirmation, percentage, 417 gas volume and, 415 and lactose broth, comparison, 415 spore formers and, 421 gas production, delayed, signifi-cance, 1034, 1276 gentian violet and, 413, 1030, 1274 lactose broth of pH 8 and, 413 liver broth and, 1029 negative, fermentation on subculture and, 1034 non-confirming; 416, 1028, 1268 pH of sample and, 421 Ps. pyocyaneus and, 421 study of, 419 subculturing, repeated, posi-tive result and, 420 seq. symbiosis and, 419, 1028 tubes of each dilution planted, number of, 1041 sample age and storage temperature and, 895 standard procedure; accuracy, 1031 revision, desirability, 1027 Bacterium paratyphosum; isolation medium, aniline dyes and, brilliant green bile and, 1052 Bacterium typhosum; isolation medium, aniline dyes and brilliant green and, 1052 longevity; in sewage and soils, 1275 in water, 115, 1275 multiplication in water; 572 fresh-water mussels and, 573 Baltimore, Md.; alum manufacture, consumption, 518, 521, 526, 538 corrosiveness, lime treatment and, 539 filter; runs, microörganisms and, wash water reclamation, 541 floc detector, 1422 laboratory control, 540 mains, wooden log, 535 manganese, 1343, 1345, 1350 metering, 518 pipe, cast iron, early use of, 534, 535

Prettyboy Dam project, aerial

mapping and, 408 purification plant data, 1190 reservoir, copper sulfate treatment. 537water supply; drought and, 528, 541 history, 535 water unaccounted for, 521 watershed, sanitary control and reforestation, 537 see United Railways and Electric Co. Bangkok, Siam; water works and rates, 16 Barberton, O.; manganese and, 1342 Bay City, Mich.; mixing, hydraulic jump and, 826 purification, 823 softening, 823 taste; activated carbon and; 823, filtration, 643 preammoniation and, 823, 828, 829 Beautification; see Water works Beggiatoa; hydrogen sulfide and, 63 taste and odor and, 63 Bellingham, Wash.; consumption and financial data, 1158 Bentonite; see Reservoir Berlin, Ger.; water supply, 20 Beverly Hills, Cal.; hydrogen sulfide, aeration and, 1403 Billing; bills; assessing against property, 697 as lien, 26 collection; losses and, 830 methods; 835 cost ratio, 835 mail, unidentified receipts and, 835 returned checks and, 837 delinquents and; 838, 1898 cut-off and; 30, 697, 1848 turn-on fee and, 30, 697 deposits and, 838 new occupant and; 698 service refusal and, typhoid and, 1187 deposits and; 1994 interest and, 1999 final and, 834 frequency; 218, 388, 698, 701, 704 cost and, 699 by responsible party guarantee and, 1994 leakage, allowance for, 702 machines and; 387 seq., 693 output rate and, 695 post cards and, 695, 700 post cards and, advantages, 696

I

F

E

E

H

E

F

E

E

promptness and, 832

ıt,

41

ad

ic

ıd

ic

3,

d

d

see Accounting Birmingham, Ala.; purification plant data, 1190

Birmingham, Eng.; water supply, 1659

Birmingham Water Works Co.; ce-ment-lined pipe; 1861 caustic water and, 1862

pH adjustment, 1861

Black death; early European epidemics, 533

Bleaching powder; see Main Bloomington, Ill.; impounding reser-voir data, 851

mixing, mechanical, 826

soap consumption, hardness and, survey, 859

softening (excess lime); and filter plant and costs, 825 odor removal and, 1114 sludge return and, 825

taste and odor, ammonia and carbon treatments and, 825, 829, 1114

typhoid epidemic, cross-connection

and, 1782 Bluefield Water Works and Improvement Co.; rate case, 1954

Boiler; feed water, mineral impurities

and, 136 scale, silicate, filtration of hot softened water through silica sand

and, 1355 alkalinity determination; water; phenolphthalein and methyl

orange, 2005 universal indicator and, 2006 phosphate determination; colorimetric, molybdate; 2009

interfering substances, 2011

volumetric, 2007

sampling, 2004 silica determination, colorimetric, 2020

Bombay, Índia; aqueduct, 19 Tansa Dam, 19

Boston Metropolitan District; consumption; 526

metering and, 516, 524 laboratory control, 829

Boulder City, Nevada; purification and softening plant; 1165

soap saving and chemical cost, comparison, 1171

Boulder Dam; see Metropolitan District of Southern California Bradford, Pa.; Dresser couplings,

1815

Brass; corrosion, ammonia and, 1759 see Pipe

Bremerton, Wash.; consumption and financial data, 1159

Brilliant green bile; see Bacterium coli test

British Columbia; water rights, 804 Bubble; see Aeration; Gases Buffalo, N. Y.; purification plant data, 1190

taste, permanganate and, 246 Burlington, Ia.; see Citizens Water

Burnaby, B. C.; water supply history,

see Greater Vancouver Water Dis-

Burton, O.; iron removal, 1406

Calcium; organic salts, sodium carbonate and, 269

Calcium carbonate; deposition as pipe coating; 1779

bicarbonate-carbon dioxide-pH equilibrium and; 992 marble test and, 992 lime treatment and, 1381, 1764

pipe coating, carbon dioxide and, 63 solubility, 992, 1778 see Alkalinity

Calcium hypochlorite; see Main Calcutta; distribution system contamination, 18

Tallah reservoir, 19 California; Boulder Dam case, 1666

California Railroad Commission; rate base cases and, 1964

California Section; 12th annual convention, 287 California Water Service Co.; Chen-

ery project; 325 cost, 343

filter plant, 336 Cambridge, Mass.; aeration, carbon dioxide and odor removal and, 1413

purification plant data, 1190 Canada; snowfall in various cities, 1011

typhoid outbreaks, water-borne, 1311

weather conditions, 1009 Canadian Section; 12th annual meeting, 899 Canal; see Aqueduct

Carbon, activated; filters; 829 bacterial and mould growths in, taste in effluent and, 1796 Crenothrix growths in, 1796

phenol adsorption and, 642

powdered; application, method, 658, 829, 1175, 1399 experience with, 1394 size, surface area and, 1398 aste removal, suitability for, phenol adsorption as index, 974 c Chlorination; Chlorination, taste

taste and odor; Chlorine absorption; Coagulation; Coagulation basin; Color removal; Dechlorination; Filtration, rapid sand; Main; Taste and odor

Carbon dioxide; alkalinity and pH, relationship; 992

equation and nomogram, 560 coagulation and; 994

alum and, 63, 1402 content, normal, 62, 64

in reservoir waters, depth and, 428, 432, 435, 1402, 1407

see Calcium carbonate; Corrosiveness; Lead; Manganese; Pipe, galvanized

Carbon dioxide determination; aggressive, 992

Carbon dioxide removal; aeration and; 63, 721, 888, 1168, 1402, 1408,

vs. lime, concentration and, 68 air lift pumping and, 1413, 1547 in aqueduct, 1412 lime and; 993, 1398, 1762

dosage required, 888 soda ash and, 1370

storage and, 106 Carbonation; 211, 828, 1375 coke and, 272, 1169 oil burner and, 212

plants employing, list of, 1192 see Softening

Carbondale, Ill.; impounding reservoir data, 849 manganese, 1342

water supply, drought and, 845, 847 Carthage; water supply, 530

Cawnpore, India; filters, Cedar Creek; hardness, 42 Cedar Rapids, Ia.; clarifiers, 827 consumption forecast, 205 seq. meters, testing, etc., 1887

softening and filter plant, 204 O.; automatic zeolite Cedarville, softening plant, 1383

Cellobiose; see Bacteria, colon group Central States Section; 33rd annual convention, 141

Centralia, Ill.; impounding reservoir data, 851

water supply, drought and, 843 Champaign and Urbana, Ill.; soap consumption, hardness and, sur-

Chl

Chl t

n

t a

F

Chl

Champaign and Urbana Water Co.; red worms in reservoir, 664, 668 Charleston, S. C.; mains; cement-lined, 1582, 1863

failures, 1735 services; 1821

installation in advance of de-

mand, 32 seq. eston, W. Va.; enteritis out-Charleston, break, 1786 taste, permanganate and ammonia

treatments and, 247 Chattanooga, Tenn.; emergency serv-

ice, 1878 purification plant data, 1190

Chemical; unloading, vacuum, 210 Chemical feed; dry; machine; makes of, 826 maintenace, 107

vs. solution, 826 types employed, tabulation of, 1192 see Ammonia; Carbon; Iron sulfate; Lime

Chester, S. C.; services, practice, 34 Chicago, Ill.; consumption, 516, 520,

enteritis outbreak, 1782 filter sand studies, 1319 filtration; ballot on, 976

experimental plant; dispensing of water from, 968

and results, 967 plant location and design, 975 progress toward, 965 proposal of early date, 965

shore intakes and, proposed, 976 leather washers, lactose-fermenting bacteria and, 1065

main failures, frequency, 1728 meter; sizes and maintenance, revenue and, 1983 master flow recorder

testing, mand, 1984 metering; 1983

program, education of public and, 1981

refrigerator cross-connections, 1759 Chicago Heights, Ill.; soap consumption, hardness and, survey, 859 China; water supplies, 2, 7

Chironomus; chlorination and, 665 filtration and, 666

life habits, 661 reservoir infestation and, 660, 665 Chloramine; see Chlorination Chloride; as pollution indicator, 135 taste and, concentration and, 135,

Chloride determination; see Salinity Chlorinated copperas; see Coagulation; Color; Iron removal; Manganese removal

Chlorination; aftergrowths, storage tanks and, 273 ammonia and; 822 seq., 1789 aftergrowths and, 273, 500, 503 application, methods, 829 cost and, 275 dosage and, 275, 502, 828 efficiency and, 247, 640, 828 plants employing, number of, 828 residual, persistence, 275, 502, 658, 690, 1173, 1176

sterilizing; action, prolonged, 247, 503

rate, 247, 500, 640, 828 apparatus, portable, 1838, 1846

B. coli; destruction, pH and, 1054 resistant strains and, 1061 Cl. welchii and, 1276 control, residual tests and, 1315 cost, ammonia and, 275

dosage; 108, 497, 1180 ammonia and, 275

hydrogen sulfide and, 275 efficiency, index organisms, B. coli and B. aerogenes, 1280

emergency, 1852 extent employed, 2, 1181

hydrogen sulfide removal by, ammonia and, 1403

inadequate, typhoid outbreaks and, 1312

pre-; 76, 223, 657, 1173, 1403, 1798 ammonia and, 657, 1360 benefits, 224, 246 carbon, activated, addition and, 658

records and, 1315 residual; practice, 889, 1328 required, pH and, 1054

see Ammonia; Chlorine absorption; Coagulation; Color removal; Crenothrix; Dechlorination; Filtration, rapid sand; Hydrogen sulfide; Main; Manganese re-moval; Microscopic organisms; Taste and odor

Chlorination, taste and odor; aeration and, 272, 1404

ammonia and; 271 seq., 500, 640, 828

dosage, 273 seq., 502, 828 bibliography, 654 activated; filtration through, 272 seq. powdered, addition, 829

chlorinous; 243

ammonia and, 974, 1114, 1173, 1176

residual and; 133 ammonia and, 275, 504, 640, 1403, 1739

temperature and, 497 microörganisms and, 243

phenol and; ammonia and, 75 seq., 247, 640, 658, 1739, 1784, 1785 carbon, activated, and, 829, 1786 concentration and, 243 H-ion concentration and, 76 measurement, 1746

permanganate and, 246 superchlorination and, 246, 644 treatment employed at various plants, list, 648

prechlorination and, 641, 645 reservoir roofs of creosoted wood and, 1784 standing, disappearance on, 1404 Synura and, 244 see Ammonia; Carbon; Taste and

odor Chlorine; solution in water, effecting,

1413 Chlorine absorption; ammonia and, 275, 502 carbon, activated, and, 1397

hydrogen sulfide and, ammonia and, 275

temperature and, 1013

Chlorine, free, determination; o-tolidin, manganese and, 1409

Churchill, Man.; frost penetration, 1015

water supply and, 1016 Cincinnati, O.; customer accounting; delinquents, handling, 697 machines and, 695

metering, 703 purification plant data, 1190 reservoir; red worms and, 660 snail shells and, 663

Circleville, O.; typhoid epidemic, cross-connection and, 1782

Citizens Gas Co., Indianapolis; main

failures, frequency, 1728 Citizens Water Co., Burlington, Ia.; turbo centrifugal pumps, performance, 229 seq.

Citrate; see Bacteria, colon group Clarifier; see Coagulation basin; Sedimentation basin; Softening

Clarksburg, W. Va.; manganese and; 1343

filter operation and, 1346

removal, 1345 Clarksdale, Miss.; services, practice,

Clathrocystis; odor and, 1116 Cleveland, O.; ammonia-chlorine treatment, 247, 829, 1360 chlorination and, and theory, 733 corrosiveness and, 994 fer-alum and, 969 ferric chloride and, 827, 969 consumption, metering and, 522, iron and; dosage, 734 ferric and ferrous, co 1768, 1769, 1775, 1777 filter plant; 822 comparison. high velocity wash, results, 1358 laboratory control, 829 H-ion concentration and, 1419 and lime; application, order and interval between, 1769, 1777, mixing, hydraulic jump and, 826 purification plant data, 1190 water cost, 1361 1778 Clostridium welchii; brilliant green cost, compared with alum, bile and, 1276 969 dosage, 1766, 1768 filter sand expansion and chlorination and, 1276 in soils, 1276 Coagulation; alum; 221 seq., 968 wash water percentage and, aeration and, 1405 alkalinity and; 1425 hardness increase and, 1773 floc, solution of, and, 1350 H-ion concentration and, 1776 application to filter influent, 10 iron, residual, and, 1774, 1777 carbon dioxide liberation and, microörganisms and, 102, 223, 63, 1402 733, 969 chlorination and, 224 clay addition and, 74 seq., 1421 mixing and, 1769, 1777 turbidity and, 1769 corrosiveness and, 63 water quality and, compared dosage; 108 with alum, 1774 acid addition and, 1438 and manganese in water as aid to, aeration and, 246 1766 carbon, activated, and, 1397 lime and, 1345 mixing and, 1424, 1567 microörganisms and, artificial turorganic content and, 1426 bidity and, lime addition and, 969, 971 prechlorination and, 224 tabulation, 1192 observations, numerical expression turbidity, low, and, 74 floe; composition, 1402, 1417 of, 1426 settling rate, microörganisms and turbidity and, 970 estimation, 1421 H-ion concentration and; 733, 1418, 1426, 1435 sodium aluminate and, 969 turbidity and, 976, 1416 winter and, 973, 1013 acid addition and, 74 seq., 272, 1405, 1431, 1438 see Color removal; Iron removal; lime and; 107, 1351 Manganese removal Coagulation basin; algae, chlorinadosage, tabulation, 1192 tion and, 108 microörganisms and; prechlorinbaffling, methods, tabulation of, ation and, 1798 turbidity addition and, 733 mixing and; 1419 clarifiers and; 827, 971, 1460 aeration and, 1435, 1439 detention period and, 827 period and velocity, 1424 efficiency, 827, 1460 organic matter and, 429 settling rates and, 827 covering, practice, 1192 residual alumina and; 1429 pH and, 1418 dimensions, tabulation of, 1192 sludge return and, 1421 flow velocity; 1459 small volumes and, 8 tabulation, 1192 and sodium aluminate, 1171, 1328 new, 718, 1174 and sodium hydroxide, 1343 odors on cleaning, prechlorination temperature and, 1421 and, 657 turbid waters and, 1423 retention period; 108, 222, 489, 718, chlorinated copperas; 888 cost, compared with alum, 969 971, 1428, 1459, 1767 and lime, 969 tabulation, 1192

Co

Co

Co

Co

sludge putrefaction, activated carbon and, 1397 worms, red, in, 665 see Sedimentation basin Coal; see Mine waste Cohoes, N. Y.; typhoid epidemic, cross-connection and, 1782 Coke plant; see Phenol Collection; see Billing Color; amount noticeable, 132 Anabaena and, 104 Clathrocystis and, 1116 iron, orgar ic salts of, and, 733 microorganisms and, 13, 102 nature of, 132 see Corrosiveness Color removal; alkali addition, color return and, 733 seq. alkalinity, caustic, and, 889 alum and; 1414 "color floe" and, 1418 H-ion concentration and, 1418 vs. iron, 1419 and lime, 888 mixing and, 1425 carbon, activated; addition and, 1397 filtration and, 890 chlorinated copperas and, 1350

9

d

d

n

d

estimation, dissolved color method, 1422

iron; ferric, and, 733 and lime; 733, 1773

color increase following adoption of, 1770 H-ion concentration and, 1769 prechlorination and, 733 in water, lime and chlorine and; 734

cost and, 735 prechlorination and, 733 sodium aluminate and, 888 Colorado River; Boulder Dam, Arizona-California case and, 1666 seq. suspended solids, content of, 1167 see Boulder City

Columbia, Tenn.; manganese and, 1342

Columbus, O.; coagulation, mixing and, 1424 consumption, metering and, 522,

purification plant data, 1190 softening, sludge disposal and, 1371 Committee reports; cast iron pipe specifications, 562 filtering materials, 1316 immediate water works better-

ments for unemployment relief, 436

taste and odor control, 1738 Community Water Service Co.; meter maintenance, revenue and, 1976 Complaints; publicity and, 1184 Conduit; see Aqueduct; Pipe Construction; cost index, E. N.-R., 1903-31, 1561 volume of, 1928 and 1931, 1562 Consumption; analysis, 519, 1367,

Baltimore, 518, 521, 526, 538 Boston Metropolitan District, 516,

524, 526 Cedar Rapids, Ia., 205 seq. Chicago, 516, 520, 1983 Cleveland, 522, 524 Columbus, 522, 524

Dairen and Port Arthur, Japan, 7 Detroit, 522, 525 Essex Border Utilities Commission, 219

Fall River, 519, 521 fire hydrants, use through, estimat-

forecasting; 205 seq., 519 accuracy, 525 Fort Wayne, 38 Frederick, Md., 523, 527

Greater Vancouver Water District, 815

Hartford, Conn., 524

house to house inspection and, 516, 523, 1125

increase, tendency toward, 521, 524 intermittent supply and, 17 Kyoto, Japan, 6

leakage survey and, 523 Lockport, N. Y., 484 London, Eng., 116 Los Angeles, 1685, 1693 Lynchburg, 517, 521, 522 maximum and average ratios, 516,

518, 973, 995, 1693 Memphis, 1539

metering and; 25, 220, 256, seq., 507, 516 seq., 522, 1126, 1979 increase following initial decrease, 522, 524

Milwaukee, 524 New York, 516, 527, 1709, 1979 Pacific Northwest cities, 1158 Philadelphia, 1980 Philadelphia Suburban Water Co.,

Providence, R. I., 524 reducing, methods, 1709 Rochester, N. Y., 524 St. Louis, 1715

San Francisco, 481 Tokyo, Japan, 5

Troy, N. Y., 54 waste survey and, 220, 523, 1711, zeolite softened water and, 1388 water cost and, 1160 Watertown, N. Y., 256 Wisconsin, 506 1779theory, 984 see Leakage; Waste Contract; standard form and, 867 Copper; content, permissible, 731 health and, 731 pernicious anemia and, 731 see Pipe; Services Copper sulfate treatment; 537 application; boat and, 244, 729 to mixing chamber of filter plant, 730 spraying and, 245 and; 1783 dosage, 106 fish and, 729 health and, 731 Synura and, 1404 see Filtration, rapid sand; Manga-Coquitlam, B. C.; see Greater Van-couver Water District Corrosion; reactions, 987 theory, 984 see Calcium carbonate; Corrosive-1781 ness; Hot water system; Iron corrosion; Pipe; Plumbing Corrosiveness; 721 see Water closet aeration and, 1403 test blue water, leakage from ammonia refrigerators and, 1759 carbon dioxide and, 63, 992, 1403, 1779 coagulation and; 994 alum and, 63 inating, 1759 H-ion concentration adjustment earth; 262 with lime; 272 seq., 539, 993, 1201 control, marble test, 723 lime treatment and, 1193, 1778 oxygen and, 988, 1403 red water; alkali treatment and, "black water" due to manganese and, 1762, 1765 carbon dioxide and; aeration and, 1406 and natural iron; 1542, 1546 aeration and iron moval and, 1544 Daytona, Fla.; coagulation, iron and lime and,

dead ends and; 96, 1773

plaints, 1764

bleeders and, 1763

lime treatment, pH and, 1763 oxygen and, 992

intensity giving rise to com-

salts, dissolved, and, 989 sodium hydroxide treatment and. zeolite softened water and; 1392 soda ash and, 1381 sodium silicate and, 1381, 1393 see Calcium carbonate; Lead Council Bluffs, Ia.; meter testing, 282 Crenothrix; in carbon filters, 1796 chlorination and, 244 iron removal and, 244 pipe tuberculation and, 103 Cross-connections; 96 distribution system, vacuum in, tests demonstrating, 1754 plumbing fixtures and, 1750, 1783 plumbing system, vacuum in, tests demonstrating, 1756 refrigerators and, 1759 sewage pump priming connection and, 1752 sterilizer and, 1760 swimming pools and, 1783 typhoid outbreaks and, 1311, 1758, Crustacea; depth and, 1794 Crystal violet; see Bacterium coli Cyclops; filter runs and, 537 Dairen, Japan; water supply and consumption, 7 Dallas, Tex.; cross-connections, elimpurification plant data, 1190 Dam; construction camps and, 14 construction, 333, 997 core wall, hollow, and, 12 excavation, cost, 263 foundation grouting and, 999 masonry, large, 19 sites, aerial mapping and, 398 seq. state supervision and, 1150 Danville, Va.; aeration, double, 1412 coagulation, aeration and, 1405 Daphnia; filter runs and, 537 hydrogen sulfide, aeration and, 1403 Dechlorination; 1740 aeration and, 1403 bisulfite and, 645 carbon, activated, and; 247, 645 filtration and; rate and, 644 regeneration, frequency and, 975

De

De

De

De

8

Di

i

Di

Di

Di

1

powdered, addition and, 658 lignite and, 645 sulfur dioxide and, 246, 645 Delaware River; diversion by New York, Supreme Court 1631, 1665, 1679 Delhi, India; filtration, 18 Court decision, Denver, Colo.; coal filters, operat-ing data, 1325 purification plant data, 1190 taste, ammonia-chlorine treatment and, 1325 water quality, 1328 Depreciation; r 1962, 1965, 1968 reserves, providing, see Financing; Valuation Des Moines, Ia.; infiltration galleries, "spreading grounds" and, 1698 Detroit, Mich.; consumption, metering and, 522, 525 dysentery outbreak in 1926, 1311 filter sand studies, 1317 intake lagoon, model studies, 1444 main failures, frequency, 1727 purification plant data, 1190 sedimentation basin, design studies, 1442 Diarrhea; in Indiana, 1908 and 1930, infant, in State of Washington, 1923-31, 1181 see Dysentery Diatoms; oxygen and, 101 see Microscopic organisms Diptera chironomus; see Chironomus Disease; intestinal, water-borne outbreak, 1178 swimming pools and, 1791 water-borne; liability and, 877, 1789 pollution and, 8 see Anthrax; Black death; Diar-rhea; Dysentery; Food; Gastroenteritis; Goiter; Jaundice; Paratyphoid; Typhoid Distribution system; anaerobic conditions and, 1793 design, 1690 fire protection requirements, 854 flow tests; methods, 854 value, 854, 858 improvement, Pitometer survey and, 255 intermittent operation, contamination and, 17 seq. investment; fire protection and, proportion of total, 1922

maps; aerial and, 404

and records, 854, seq., 1853, 1922

nd,

282

in,

sts

ion

58,

oli

nd

m-

12

e,

d,

value, 1852 pressure boundaries; circulation provisions, 858 design and, 858, 1699 repair parts, stocking of, 857 trunk mains, velocities, economic, vacuum in; heavy drafts and, 1783 shutting off and draining of mains and; 1754 venting and, 1756 valves; fire protection hazards and, 384 records, 1932, 1934 wells on, 1684 see Hydrant; Hydrogen sulfide; Main; Pipe; Valve District of Columbia; rainfall, 1930 and normal, 77 Dresden, Ger.; manganese removal, 19 Drought; see Rainfall Dundee, Mich.; activated carbon filtration, 643 Dwight, Ill.; reformatory, iron and hydrogen sulfide removal plant, 1403, 1406 Dysentery; animal pollution and, 1312 water-borne epidemic, 1311

see Diarrhea East Bay Municipal Utility District; San Francisco emergency supply connection, 479 Liverpool, Md.; manganese and, 1343
East Windsor, Ont.; see Walkerville-East Windsor Water Commission Edinburgh, Scotland; filters, 20 Electric power; rates, 825 see Hydro-electric Electrolysis; east iron pipe, electric railways and, 1719, 1734 metal removed per ampere, 348 Electromotive series; 985 **Emergency Relief and Construction** Act; of 1932, text of, 1208 Emergency service; 1130 organization, 1875 truck; lighting equipment, 1880 valve operating equipment, elec-tric and air, 1876, 1879 Pa.; emergency organization, Erie 1875 employees pension scheme, 1943 purification plant data, 1190 Esculin; see Bacterium coli test Essex Border Utilities Commission; consumption, 219 filter operation; 224 seq.

cost. 227 runs, algae and, iron and lime and, 102, 223 winter and, 1013 intake, ice and, 220, 1012 mains and services, depth and, 1011 metering, 220 prechlorination, 223 seq. purification plant data, 1190 water supply and treatment, 217 Eugene, Ore.; consumption and financial data, 1158 Evansville, Ind.; purification plant data, 1190 Evaporation; see Reservoir; Stream Everett, Wash.; consumption and financial data, 1158 typhoid epidemic, cross-connection and, 1782 Everglades, Fla.; water supply and purification, 885 Extensions; engineering advice and,

Excavation, see Dam; Trench
Extensions; eee Dam; Trench
Extensions; engineering advice and,
1566
national work relief construction
program and, 436
needs, in United States, estimate
of, 436
postponing, false economy and, 128
seq.
procedure, preliminary, 28
work orders and, 278
see Financing; Main

Fairmont, W. Va.; manganese and, 1343, 1346 Fall River, Mass.; consumption, statistics, 519, 521 water unaccounted for, 521 Faucet; see Tap Feces; B. coil-B. aerogenes ratio in human and animal, 1269 Federal Water Service Corporation; see Alabama Water Service Co. Fer-alum; see Coagulation Ferrous; see Iron Filter sand; committee report on, 1316 effective size, definition, 705 grading; effective size and uniformity coefficient and, 705 surface area and void volume, 705 grain, average, weight and volume, determining, 710, 714 grains per unit volume, determin-ing, 711 size determination, with microscope; 1331

sieve results, comparison with,

specific gravity, 708, 1333, 1335 surface area, determining, 708 uniformity coefficient, definition. 705 void volume, determining, 708 see Filtration, rapid sand Filtration; adoption, campaign and, experimental plant and, 968 extent employed, 1173, 1180 history, 535, 1789 Puech Chabal plants, 18, 19 see Iron removal; Manganese removal Filtration, double; plant, 117 Filtration, drifting sand; plant, 1200 Filtration, pressure; filtration rate. plants; 20, 108, 1193 early, 535 new, 719 sand and gravel data, 719 Filtration, rapid sand; adoption in foreign lands, 2, 18, 21 air-binding, microorganisms and, 1795 coal as medium; 1195 combined with sand, 1327 operating data, 1325 efficiency; 109, 1347, 1360

pre-ammonia-chlorine treatment and, 657 floc, passing of, mixing and, 1429 gravel; cemented, 1192, 1202 depth; 212, 337, 1170, 1174, 1770 tabulation, 1192 size; 337 tabulation, 1192

tabulation, 1192
head loss; bed depth and, 1318
filtration rate and, 1318
increase, rate of; coagulation
and, 1324, 1329
sand size and, 1320, 1329
sand angularity and size and, 1318
temperature and, 1318
ice formation and, 1013
influent main and inlets, velocity
and, tabulation, 1192
inlets, drifting jet, 827

microorganisms, removal, prechlorination and, 1798 operating cost, 227 plants; 5, 9, 14, 16, 117, 822, 828 cost, 342 seq., 492, 824, 825 descriptions, bibliography, 1202 design; experimental plant and, 967

and operation data, tabulation of, 1190 experimental, glass tube units, 1319

first in United States, 535 new, 5, 6, 10, 18, 212, 336, 489, 899, 1170, 1174 rate; 212, 225, 337, 973, 1325, 1328 master controller, 1555 permissible, in N. Carolina, 719 tabulation of, 1192 roof, draining into units, 1784 runs; 109, 1328, 1548, 1772 algae and; 492, 729, 1363 opper sulfate addition to mixing chamber and, 730 copper sulfate iron and lime coagulation and; 102, 223 chlorine and, 735, 969 turbidity addition and, 102 carbon, activated, and, 658, 1176 coagulation and, 74 seq., 687, 1439 Cyclops and Daphnia and, 537 head loss, final, and, 492, 730, 1195, 1347, 1770 manganese and, 429, 1347 prechlorination and, 224 wash, high velocity and, 1360 sand; bacterial growth in, prechlo-rination and, 1795 blackening and caking, manga-nese and, 78 caking, prechlorination and, 1796 cleaning, caustic soda and, 1771 clogging, manganese and, 1406 coatings; 225 coagulation, iron and lime, and, 1772 iron and, 434, 1349, 1773 manganese and; 78, 434, 1342, 1773, 1799 removal, acid, and 1344 solution of; carbon di-oxide and, 1345, 1347 copper sulfate treatment and, 1343 idle filters and, 1347, 1348, 1786 taste and odor removal and, 1799 condition, prechlorination and, copper sulfate treatment of, 1175 depth; 212, 225, 337, 827, 1170, 1174, 1359, 1770 tabulation, 1192 floc penetration, 1361 microscopic examination, value of, 1796 mud balls; 10 manganese and, 1343

wash and; 225 rate and, 1772

tion,

and,

re-

1200

rate,

n in

and,

nent

70

ion

318

eity

or-

2

nd,

la-

its,

shrinkage; 224 manganese and; 1343 air wash and, 1346 size; 212, 225, 337, 827, 1346, 1359, 1361, 1770 increase and, 1770 tabulation, 1192 turbidity of applied water; 1347 limit and, 223 tabulation, 1192 underdrains; 213, 337, 1170, 1174, type, tabulation, 1192 units; idle, taste and high bacterial counts and, 1785 size and; 971 tabulation, 1192 wash; air in sand bed and, 1013 air-water; 5, 1326, 1347, 1363, 1405 plants using, list, 1192 double; sand condition and, 1362 water percentage and, 1363 pumping, direct, and, 337, 1174, 1194 rakes, mechanical, and, 5 raking prior to, 1343, 1359 rate; 337, 489, 972, 1174, 1326, 1347, 1348, 1770 sand condition and high; sand loss and, 1358 water percentage and, 1360 tabulation, 1192 sand expansion and; iron and alum coagulation and, comparison, 1772 temperature and; 1013, 1358 and rate (coal as medsand loss and, 1770 surface, 825, 827, 972 water; microscopic examination, value, 1796 percentage; 492, 729, 1328, 1347 iron and alum coagulation and, comparison, 1772 tabulation, 1192 reclamation, 341, 541 troughs; 337, 827 height and distance between, tabulation, 1192 water level control device, 1552 see Filter sand; Iron removal; Soft-ening; Tank Filtration, slow sand; history, 113, 535 plants, 4, 5, 6, 7, 9, 18, 117, 1192, 1197, 1198, 1201, 1205, 1206

508

1011

hazards and, 384, 386

location, curb and, 1857

inspection; frequency, 855, 1856 practice, 258

main size, marking and, 1860 prevalence, decreasing, 2, 18 rate, 4, 5 maintenance and inspection cost, as secondary filters, floc in applied 1857, 1899 numbering, 1932 painting, 1858 water, runs and, 1430 Financing; bond interest rates, 1901use for other than fire purposes, 508 30, 1558 Fire insurance rates; trend, 1575, 1579 water supply and, 1569, 1579 Fire loss; in United States in 1930, 438 budget and, 279, 1904 capital expenditures, budget, longterm and, 1906 debt amortization and, 1155, 1160 depreciation fund and, 1154 Fire protection; charging for; hydrant rental and, 256 extensions and; 1567 main mileage and, 256 fair return and, 1917 practice, 218 classification, water supply and, improvements and; 1915 reserves, for leveling peaks and 1569 valleys, 1911, 1917, 1920 liability and, 855 extensions; assessment pumpers and, 854 main against property, 1161 practice, 31 water supply; improvements, coordination with other services. municipally-owned plants; 1912 1578 banking, bonding and, 26 system defects and, 382 capital expenditures and, 27 seq. water works investment and, 384, funds, diversion, 23 1573 olicies, costs and revenues Pacific Northwest cities, 1157 policies, see Distribution system; Pressure revenues of Fire protection, private; rates for, private and public ownership com-bined, 1912 256 seq. see Sprinkler system Flint, Mich.; meter reading, piece privately-owned works and, 1917 work pay and, 902 reserves and, 1916 purification plant data, 1190 return, fair rate and, 1953 revenue; analyses, 1157, 1898 downward trend, relief from, Flood; see Stream; Water works Flow; see Distribution system; Pipe flow; Stream 1893 Fluoride; in water, mottled tooth enamel and, 1787 Flushing, N. Y.; iron removal, 1406 Flushometer; see Water closet home beautification, encouraging and, 1897 losses through electrification, regaining, 1895 Food; poisoning, B. lactis aerogenes and, 1277, 1280 Forest; see Watershed see Accounting; Construction; Depreciation; Rates; Taxation; Valuation; Water, gratuitous Findlay, O.; clarifier, 827 filters, surface wash and, 825 Fort Wayne, Ind.; consumption, 38 purification plant, proposed; 45 purification plant, 825 cost, estimated, 47 softening, lime-zeolite, 825 Fire hose; connections and nozzles, standardization, in Montana, 904 softening, proposed, 42 seq. typhoid epidemics, cross-connections and, 1782 flow calculations, 119 water supply, new, 36 seq. Fort Worth, Tex.; purification plant Fire hydrant; capacity marking; 1854 Maine Water Utilities Association and, 1858 data, 1190 painting and; 1858

Fostoria, O.; softening, sludge prob-lem and, 1371, 1392 vs. numerals, 1855, 1857 consumption through, estimating, Four States Section; annual meeting, 1932, 1232 Franklin Furnace, N. J.; typhoid freezing, prevention, alcohol and, epidemic, cross-connection and,

1782Fraser Mills; water supply, 819 Frederick, Md.; consumption; 527

waste survey and, 523

Fremont, O.; chemical feed, 826 clarifier, 827 softening, excess lime, sterilization and, 824

t,

9

18

l,

0-

4,

ce

h

15

e-

ıt

5,

d

Frost; see Fire hydrant; Main; Soil; Tank; Water supply

Fuchsin; see Bacterium coli test

Galesburg, Ill.; impounding reservoir data, 851

Galveston Electric Co.; valuation case, 1959

Gas and coke works; see Phenol Gases; bubbles; rate of rise in water, 70

size, orifice diameter and, 71 removal; aeration and; 1403 concentration and, 68 rate, formula, 65

solution, rate of; 64 seq.

formula, 65 see Air; Carbon dioxide; Hydrogen sulfide; Nitrogen; Oxygen; etc. Gastro-enteritis epidemics; leakage

Gastro-enteritis epidemics; leakage through gravity conduits and, 1782 purified polluted water and, 1786 Gentian violet; see Bacterium coli

test Glencoe, Ill.; dechlorination, bisulfite and, 645

Goiter; iodization and, 1787

Grand Rapids, Mich.; emergency service, 1878

purification plant data, 1190 stock inventory, 1874

Greater Vancouver Water District; consumption, 815

municipalities supplied, 819 organization, 809 rainfall, 811

rates, bulk, 821 water quality, 816

water supply history, 795, 807 watershed protection, 818 Greenville, Ill.; enteritis epidemic,

1782 Greenville, Miss.; water works, flood

and, 1850 Greenville, Tenn.; pre-ammoniation,

Greenwich, Conn.; aeration, 1412 Griffin, Ga.; delinquents, cut-off and,

financial data, 35 metering, 29

services; charge for, 30 practice, 33 seq. water unaccounted for, 29

Gunite; see Pipe, steel; Reservoir

Hackensack Water Co.; laboratory control, 829

taste and odor, activated carbon and, 1397

yard stock inventories, 1869 Hagerstown, Md.; phenol tastes, ammonia and, 75

Hamm, Ger.; activated carbon filtration, 644

Hardness; coal waste and, 1366 distribution, geographical, in United States, 105

heater coil clogging and, 75 laundering and, 1365 lime and iron coagulation and, 1773 losses due to, 1128, 1171, 1364

noises due to, 1128, 1171, 1304 microörganisms, variations due to, 1796 storage and, 52

see Pipe, cement-lined; Soap; Softening Hardness determination; non-carbon-

ate, soda reagent, organic salts and, 268 seq. Hartford, Conn.; consumption, me-

tering and, 524 main sterilization, 1844

Harvard University; filter sand studies, 1318

Health; algae and, 104 copper and, 731 mineral content and, 887 taste and odor and, 1112 see Disease

Highland Park, Ill.; mechanical agitation, 1441

Holyoke, Mass.; delinquents, 1849 fire protection, 1581 leakage, locating, 1885

Hong Kong, China; water supply, 9 seq.

Honolulu; water supply, 3 Hoover Dam; see Boulder City, Nevada

Hot Water system; coil clogging, hardness and, 75 corrosion; lime-soda softened water

nardness and, 75 corrosion; lime-soda softened water and, 1381 oxygen and, 1391

Hydraulic jump; see Mixing Hydraulics; model studies, 1443 Hydro-electric power; cost, compared with steam, load variations and,

production, stream diversion, effect of, 1642 see Electric

Hydrogen-ion concentration; adjustment, lime and, 76, 107, 1398, 1763 aeration and, 721

carbon dioxide and alkalinity, relationship; 992

equation and nomogram, 560 explanation of term, 133, 984

see Alkalinity; Bacterium aerogenes; Bacterium coli; Bacterium coli test; Calcium carbonate; Chlorination; Coagulation; Corrosiveness; Jaundice; Lead; Manganese removal; Swimming pool

Hydrogen sulfide; distribution system, formation in, 1793 odor and, content and, 63 paint discoloration and, 1793

see Bacteria, sulfur; Chlorine absorption

Hydrogen sulfide removal; aeration and; 63, 546, 721, 1403, 1412 and chlorination, 1793 chlorination and; 1740

ammonia and, 1403 see Gases Hypochlorite; see Main

Ice; see Frost; Intake Idaho; purification plants in, 1173 Illinois; droughts previous to 1930, 846

Masonic Home, softening, soap consumption and, 861

reservoir sites, study of, 848 water supplies; drought of 1930 and, 840

safety, legal responsibility and, 877

sources, 875 wells, standard specifications, 877 Illinois Bell Telephone Co.; rate case, 1955, 1967

India; water supply problems, 17 seq Indiana; diarrhea, reduction and,

typhoid, reduction and, 1019 water supplies; classification, 1296 number of, 1020 quality, 1020

water works; officials, tenure of office and, 1025 operators, school proposed for,

1025 State Bd. of Health orders, compliance with, 1026

Indiana Section; activities, major, proposed, 1025 meeting, 25th, 737

twenty-five years in retrospect,

Indianapolis, Ind.; ground water con-tamination by garbage waste, 266 see Citizens Gas Co.

Indianapolis Water Co.; consump. tion, analysis, 1707

emergency service, 1879 faucets, dripping, volume wasted.

1708 financing, budget system and, 1904 inquiries, handling, procedure, 625 Irvington tank, control equipment,

mains; electrolysis, 1719, 1734

failures; analysis of, 1717 frequency, 1722, 1728 meter reading, frequency, 1708 metering, 623, 1706 pressure, 627, 1734 purification plant data, 1190 rate case, 1954 services; installation in advance of pavement, 633

maintenance and replacements, 624

pressure losses in, 623 water unaccounted for, 1707 Indicator, universal; 2006 Industrial wastes; taste, list of wastes causing, 637
see Oil; Pollution, industrial wastes

Infiltration gallery; 1205

supply, increasing, spreading grounds and, 1698

Inquiries; handling, procedure, 625 Intake; ice and; conditions favoring, 221flow reversal and, 220, 1012

lagoon, Detroit, 1444 pipe, flow problems, 125 river elevation variations, pump

car on inclined railway and, 1166 Interstate Commerce Commission; interest during construction and, 1971

Inventory; see Materials Iodine content of water supplies, 109 Iodization; 1787

Iowa City, Ia.; meter testing, 282 Iron; filter sand coating and, 434, 1349

laundry staining and, 1546 organic salts, color and, 733 plumbing, staining and, 716, 1546 in reservoir waters; depth and, 428, 1766

matter decomposition organic and, 425

overturn and, 428, 1766

stripping and, 426 solution of from pipe rust by zeolite-softened water, 1382, 1392 in water; as coagulant, 1766 concentration, objectionable, 137

mp-

ted, 1904 625 ent,

e of nts.

stes stes

ing 25 ng,

mp 166 on: nd,

109282 34,

546 28,on

0. 92 37

sand; Well Iron chloride; see Coagulation Iron corrosion; carbon dioxide and, protective scale formation and, 990 reactions, 987 see Calcium carbonate; Corrosion; Corrosiveness; Pipe Iron hydroxide; ferrous, solubility, see Coagulation; Color removal Iron, pig; cost, 1880-1931, 1559 Iron removal; 244 aeration and; 1405, 1414 in coke trays; and filtration, 1547 lime and filtration, 717 plant cost, 720 excessive and, 1406 and filtration under pressure, Elgin process, 1403, 1406, 1414 and gravel beds, upward flow, 1550 coagulation; alum, soda, hypochlorite and filtration; 429 permanganate and sodium aluminate and, 430 chlorinated copperas and, 1350 filter sand coated with manganese and, 1344 filtration, rapid sand, and, 1415, 1548 lime and, 109, 1406 in textile industry, 1778 zeolite softening and, 1370, 1382 Iron sulfate; ferrous, caking in bins and feed apparatus, 1775 see Coagulation; Color removal; Manganese removal Irrigation; ground water replenish-ment and, 1689 surveys, aërial mapping and, 400 Jacksonville, Fla.; water works beautification, 1881 Jamaica, N. Y.; taste, superchlorina-tion and, 644 Japan; water works, 3 seq. Jaundice, spirochaetal, water-borne; pH and, 1791 rats and, 1790 Jerusalem; ancient, water supply, 530 Jinsen, Chosen; water works, 7

Kansas; Bd. of Health, B. coli tests,

Kansas City, Kans.; purification plant data, 1190

fuchsin broth and, 413

zeolite softening and, 1393

see Corrosiveness; Filtration, rapid

2067 Kansas City, Mo.; municipally-owned utilities, funds, control, 1913 purification plant data, 1190 Keijo, Chosen; water works, 7 Kenosha, Wis.; meter testing, 510 metering, 507 pitometer survey, 507 water unaccounted for, 507 noxville, Tenn.; purification plant Knoxville, data, 1190 Kobe, Japan; water works 6 Kyoto, Japan; consumption, 6 water works, 5 Laboratories; water works, 829 see Purification; Softening Lake Forest, Ill.; swimming pools, negative pressure in mains and, Lancaster, Pa.; taste, ammonia-chlorine treatment and, 247 LaSalle, Ont.; see Essex Border **Utilities Commission** Latham Water District, N. Y.; artesian water supply, 547 water quality, 551 Laundry; hard water and, 1365 iron and, 1546 manganese and, 1765 Lawrence, Mass., aeration, 1413 Lead; solvency; carbon dioxide and, 1111 H-ion concentration and, 1764 lime treatment and, 1762, temperature rise, effect on, 532 see Pipe, lead; Services Leadville, Colo.; main freezing, steam injection and, 1014 Leakage; classification, 1712, 1714 computing (from cracks, etc.), 1713 detection, consumption reduction and, 523, 1711, 1715

locating, 1884 main failures and, 1716 pavement undermining and, 1884 pitometer survey and, 507, 1714 precautions against, 1715 survey, cost per million gallons saved, 1711 water hammer and, 94 seq.

see Main; Pipe joint; Services; Water unaccounted for Leather; colon bacteria and, 1062 Le Roy, N. Y.; water supply, 262 Leroy, O.; corrosion in hot water systems, 1381 Lewiston, Idaho; consumption and financial data, 1159 Lime treatment; excess, sterilization

and, 824

feed, dry, 826, 1775 hydrated vs. quick, cost and, 1775 reactions, 993 Calcium carbonate: Carbon dioxide removal; Coagulation; Corrosiveness;

Hydrogen-ion Iron removal; concentration: Lead; Manganese removal

Lincoln, Neb.; pipeline, bids on, 360 Lincoln Gas Co.; rate case, 1968 Lisbon, Portugal; water-borne jaundice, 1790

Little Falls, N. J.; filters, early use of, 535

Little Falls, N. Y.: Spruce Creek diversion agreement, 1650, 1658 Lochaber; water power scheme, 1644 Lockport, N. Y.; consumption, 484

filter and pumping plant, new; 483 cost, 492

metering, 486 Lockport Light, Heat and Power Co.; rate case, 1958

London, Eng.; black death epidemic of 1665, 533 consumption, 116 filtration, early use of, 113, 535

main failures, 346 Metropolitan Water Bd., 114 purification and pumping works data, 116

water supply; 20, 110
history, 111, 534
Long Beach, N. Y.; iron removal,
gravel beds and, 1550

Long Island; geology of, 1523 rainfall, 1523

Los Angeles, Cal., activated carbon filtration experiments, 829 consumption, 1685, 1693 distribution system expansion, 1684 field orders, handling of, 394

ound water, replenishing, "spreading grounds" and, 1689 meter reading and petty trouble handling, 392

population increase, 1685, 1697 water supply; 1684

sewage reclamation and, 1786 wells, loss of, analysis of causes, 1534

Wilmington filter plant and ferric chloride coagulation, 827

see Metropolitan Water District of Southern California

Los Angeles County Flood Control District; San Gabriel dam No. 2, reservoir area and capacity curves,

Louisville, Ky.; filters; early use of.

runs, algae and, turbidity addi-tion and, 102

purification plant data, 1190 Lowell, Mass.; manganese removal, excessive aëration and, 1406 typhoid outbreak, cross-connection and, 1781

Lucknow, India; consumption, intermittent vs. continuous supply and.

Luke, Md.; manganese, 1343, 1777 Lyman, S. C.; water supply data, 109 Lynchburg, Va.; consumption; 521 metering and, 517, 522 water unaccounted for, 521

Macon, Ga.; metering and consumption, 25 rates, 26

water works; administration, 24 employees insurance, 26 financing, 26

Magnesium hydroxide; solubility, 1778

M

M

M

Main; congested districts, construction in tunnels and, 576 cost statistics, 1925-32, 1565 dead ends, flushing arrangement,

1862 depth, practice, 1011, 1013 dual, on wide streets, 1823 extensions; material records, 558

planning, 1122 practice, 32, 1923 failures; 346 causes, 1702

earth shrinkage in dry weather and, 1124 leakage and, 1716

traffic and, 347

feeders, new, connecting, method,

fire protection hazards, 384 seq. freezing, prevention, steam injection and, 1014

frost, perpetual, and, 1016 laying, cleaning of pipe prior to, 1837

leakage; detecting, 509 materials and, 514 reasonable amount, 508 statistics, 506

maintenance cost, 1899 manganese deposition in, 1343, 1351 new; contamination, extent of, 1847 tarry odor, removal with ac-

tivated carbon, 1397 retirements, practice, 1935

sediment, B. coli and, 1841 of, small, replacing, stagger system, ddisteel; economy and, 354 seq. merits, 345 seq. tapping, 353 val. sterilization; chlorine and; contact period and, 1841 dosage, 1838, 1840, 1843, 1844, 1845, 1848 tion torvs. hypochlorite, 1848 and. joints, painting with satu-rated solution and, 1841 portable apparatus and, 1838, 100 1845, 1846 521 results, 1848 cleaning prior to, 1837 HTH, cement-lining and, 1845 hypochlorite and, 1838, 1843, mp-1844, 1846 repair work, following, 1842 sediment introduced with water 24 and, 1841 trunk, pitometer surveys; 669 findings, examples, 673 lity, see Distribution system; Financing; Leakage; Pipe Maine Water Utilities Association; rucfire hydrants, capacity marking, 1858 ent, Malachite green; see Bacterium coli test Manganese; bibliography, 1348 as coagulant, 1766 558 deposition; by bacteria, 78 in pipelines, 78, 1343, 1349, 1351 discoloration following alkali treatment and, 1762, 1765 filter sand; coating; 78, 434, 1342, ther 1773, 1799 removal, acid and, 1344 solution of; carbon dioxide and, 1345, 1347 hod, copper sulfate treatment and, 1343 seq. filters idle and, 1347, jec-1348, 1786 clogging and, 1406 laundry staining and, to, mine drainage and, 1341 oxidation by bacteria, 88 seq. paper manufacture and, 1343 in reservoir waters; depth and, 427, 1766 ganic matter decomposition and, 425, 1349 organic

overturn and, 428, 1766 stripping and, 426

o-tolidin and, 1409 in waters of Texas, 78 seq.

1351

1847

ac-

zeolite softening and, 1391 see Bacteria, manganese; Filtration, rapid sand Manganese determination; periodate and bismuthate methods, 82 Manganese hydroxide; solubility, 90 Manganese removal; 244 aëration and: 1405 excessive and, 1343, 1406 and filtration; 20, 721 through coke, etc., 1345, 1777 chlorination and, 1345, 1351 coagulation; alum and; 1350, soda, hypochlorite and filtration; 429 permanganate and, pH and: 429 sodium aluminate and, 430 chlorinated copperas, pH and, 1350 ferric vs. ferrous salts, 1777 iron and lime and, 1345, 1350, 1766, 1776 filter sand coated with manganese, pH and, 1344 lime and; 1342 pH and, 1345 manganese bacteria and, 19 permanganate and, 1345 precipitation, pH and, 1768, 1777 softening; lime and, 1766 lime-soda and, 1345 in textile industry, 1778 zeolite and, 1345, 1778 Manggari; laboratory investigations, Manila; metering and water unaccounted for, 11 water supply, 11 Marion, Ill.; water supply, drought and, 850 Marion, O.; softening, sludge problem and, 1371 Maryland; drought of 1930 and, 1147 stream gaging and, 1149
Water Resources Commission, program, 1147 water supplies, data, 1148 Materials; distribution control; 1873, 2000 repair and service trucks and, 2003 inventory, perpetual, 554 store rooms and, 2001 yard stocks, inventory methods, 1869 see Specifications Maumee River; watershed, 39 seq. Medford, Ore.; consumption and financial data, 1159

Melbourne, Australia; water supply, Memphis, Tenn.; carbon dioxide removal, air-lift and coke aërators, 1413, 1547 consumption, 1539 financing, 1914 ground water, geology of area and, 1513 iron removal, aëration and filtration and, 1547 red water; 1542, 1546 aëration and iron removal and, 1544 water supply; 1513, 1539 history, 1541 Parkway Station, 1543 quality, 1546 Sheahan Station, 1544 well construction methods, 1521 Metal; see Copper; Corrosion; Electromotive series; Iron; Lead; Pipe Meter; accuracy; specifications, 1889 tests of, 1887 charge for, 25 compound, accuracy, 1992 corrosion, 1381 head loss, 124, 1983, 1990 hydrant vending, "nickel in slot" meter and, 14 inaccuracy, causes, 1886 installation cost, 255, 523 location, at curb, 1836 maintenance; charging for, 703 cost, 1899 revenue increase and, 1976, 1983 overhauling, frequency, 1899 ownership, practice, 25, 255, 514, 701 records, 1890 reversal with compressed air, 1753 size; 514 accuracy and, 1983, 1992 stuffing box, rubber bushings and, testing; charging for, 702 frequency, 282, 510, 513, 1886 low flows and, 514 master flow recorder and, 1984 in place, 1231 setting back, and 700 under-registration; 505 seq., 510, 1704, 1707 correcting, revenue increase and, 512, 1976, 1983 location near pipe bends and, 1704 low flows and; 513, 1706, 1707 "gulfer" and, 1892

refrigerator, gas-operated, and,

Meter reading; consumption, usual, notification and, 394 cost, 394 frequency, 393, 1708 number per man per day, 394, 1899 and petty trouble divisions, consolidation, advantages, 393 seq. piece work pay and, 1902 see Accounting; Billing Metering; advisability, 1901 Baltimore, 518 Bangkok, 16 Boston Metropolitan District, 516. 524 Chicago, 1983 Cincinnati, 703 Cleveland, 522, 524 Columbus, 522, 524 Detroit, 522, 525 Essex Border Utilities Commission, 220 Griffin, Ga., 29 Hartford, Conn., 524 Indianapolis, 623, 1706 Kenosha, Wis., 507 Lockport, N.Y., 486 Lynchburg, Va., 517, 522 Macon, Ga., 25 Manila, 11 Milwaukee, 524 New York City, 523, 1979 Philadelphia, 1980 Pittsburgh, 1981 program; 25 education of public and, 1981 Providence, 524 Rochester, 524 St. Louis, 1715 Troy, N. Y., 54 unauthorized use and; 1705 dripping into containers and, 1706, 1707 water bill and, 1981 Watertown, N. Y., Windsor, Ont., 220 255 see Consumption Methyl red test; see Bacteria, colon group Metropolitan Water District Southern California; Boulder Dam, Arizona-California case and, 1666 seq. Miami, Fla.; purification plant data, Michigan State College; swimming pool chlorination, observations, 1061 Microscopic examination, recording, method, 220

M

M

M

M

N

N

N

Microscopic organisms; aeration and, alkalinity, caustic, increase and, 107 books and, 226 chlorination and; 108, 661, 1740, ammonia and, 503, 1177 classification, 98 coagulation and; alum and; prechlorination and, 1798 turbidity addition and, 733 iron and lime and; 102, 223, 733, 969 chlorination and, 735 turbidity, artificial and, lime addition and, 969 color and, 13, 102 control; importance, 1792 methods, 102 seq. depth and, 100, 1407, 1794 depth of draft and, 1767, 1794, 1797 fertility of water for, criterion, nitrogen values and, 100 seq. food supply and, 100 hardness variations due to, 1796 light and, 100 lime softening and, 1115, 1352 occurrence, 98 seq. odors, aërial, and, 103 oxygen liberation and, 1409, 1795 poisoning of cattle and, 104 pollution and, 101 rainfall, heavy and, 1409 seasonal distribution, 99 seq., 106, temperature and, 99 seq. turbidity and, 100, 102, 107, 733 see Chlorination, taste and odor; Copper sulfate; Filtration, rapid sand; Odor; Reservoir; Taste and odor Middleboro, Mass.; iron removal, excessive aëration and, 1406 Midge fly; see Chironomus Milwaukee, Wis.; accounting, 553 consumption, metering, and 524 elevated tank, new, 259 elevated tank, new, main sterilization, 1845 water works organization, 553 Mine waste; acidity of, biological theory, tests supporting, 1341 manganese in, source of, 1341 Mineral content; health and, 887 nature of, 136 seq. Minneapolis, Minn.; B. coli tests, broth of pH 8 and, 413 manganese and, 1342, 1347, 1348, 1786

ın-

399

n-

eq.

16,

n

d,

n

of

ı,

microörganisms, taste and odor, prechlorination and filtration and, 1797 purification plant data, 1190 Minnesota Section; 1931 meeting, 139 Missouri Valley Section; 17th annual meeting, 281 Mixing; aëration and; diffused; 687, 1405, 1434 ejectors and, installation and operating cost, 1438 spray, 1428, 1430 baffles; 107, 222, 657, 826, 1428, 1431 adjustable, 1431 first use of, 1431 type employed, tabulation, 1192, 1436 bibliography, 1437 circular motion and, 71 first use of, 1420 head loss, tabulation, 1192 hydraulic jump and; 826, 1435 head required, 1437 impeller and draft tube, 1168 laboratory apparatus, 1420. laboratory apparatus, 1420, 1439 mechanical; 45, 339, 718, 826, 970, 1174, 1432, 1441 first use of, 1432 pre-mixing by flow direction change and air, 210 square tanks and, 1441 velocity variations and, correction, 1433 period; 107, 222, 489, 718, 970, 1168, 1441, 1767 tabulation, 1192, 1436. practice, 1416 pump and, 222, 230, 1429 spiral flow tank; 1429, 1433, 1460, 1767 air jets and, 1430, 1434 type employed, tabulation, 1192, 1436 velocity and, tabulation, 1192, 1436 see Coagulation; Softening Molds; in water, 84 Monroe, La.; lime and chlorine co-agulation, 733 Montana; fire hose connections, etc., standardization, 904 Montana Section; 7th annual meeting, 902 Montreal, Que.; mains, depth and, 1013 purification plant data, 1190 Morgantown, W. Va.; manganese and, 1343 Mount Vernon, Ill.; manganese and, 1343

Mount Vernon, N. Y.; financing, 1914

Murphysboro, Ill.; manganese and, 1343

Mussel, fresh-water; bacterial multiplication in water and, 571 water contamination and, 572

Nashville, Tenn.; purification plant data, 1190

Neodesha, Kans.; mixing, aëration and, 1405

New Bremen, O.; zeolite softening;

red water and, 1388, 1392 New England Power Co.; tax case,

1974 New Haven, Conn.; sewage treatment plant, storm overflow, auto-

matic regulation, 1551 New Jersey; Delaware River diversion, Supreme Court decision, 1631,

1665, 1679 New Orleans, La.; coagulation, iron

and, dosage, 734 mixing, early use of, 1420, 1431 purification plant data, 1190

purification plant data, 1190

New Westminister, B. C.; water supply history, 802

see Greater Vancouver Water

District
New York City; aëration: during
flow through aqueduct, 1412
steps and, efficiency, 1413
water quality and, 1407

consumption; 516, 527, 1709, 1979 reduction program, 1709 Delaware River; diversion, So

Delaware River; diversion, Supreme Court decision, 1631, 1665, 1679

supply, cost, 1980 employees pension system, 1947 main sterilization, 1837 manganese and, 1349

metering and, 523, 1979 reservoir, water quality, depth and, 1402, 1407

taste, superchlorination and, 246, 644 waste detection survey, 1709, 1716

water cost, 1979 well supply, Long Island; 1523 new wells; 1524 costs, 1531

New York Harbor; pollution, air absorption and, 64, 1412 New York State; Delaware River di-

New York State; Delaware River diversion, Supreme Court decision, 1631, 1665, 1679 typhoid, 1900-30, 55 water storage law, 1659

Newark, N. J.; see North Jersey Metropolitan District Nitrate; significance, 135 Nitrite; significance, 135 Nitrogen; content, normal, 62 forms of, as index of fertility for

forms of, as index of fertility for plankton growths, 100 seq. solution, rate of, formula, 65 see Gases

Norfolk, Va.; purification plant data, 1190

North Carolina; drought of 1930; 187

possibility of greater droughts and, 199

filtration, rapid sand, permissible rate, 719

streams; flow, minimum and, 171 seq. gaging, 172 seq.

North Jersey Metropolitan District; Pequannock supply system; 494 chlorination and, 497 quality, 496

taste and odor and; 496 chlorine-ammonia and, 500 Wanaque; aqueduct, sterilization, 1842

reservoir, manganese and, 1349 North Vancouver, B. C.; water supply, 806 see Greater Vancouver Water District

Oakland, Cal.; purification plant data, 1190

Odor; aëration and, 686, 1113, 1404, 1409, 1739 Asterionella and, 1409

carbon, activated; filtration and, 1114 powdered and; 1113

dosage, 1115, 1117 chlorination, ammonia and; 688, 1114

dosage, 690 Clathrocystis and, 1116 coagulation and filtration and, 688,

dead ends and; 96 ammonia-chlorine and, 690

hydrogen sulfide content and, 63 intensity; noticeable, 1114 tolerated without complaint, 690 lime softening and, 1114

lime softening and, 1114 measurement; 1741 concentration by distillation and, 1745

dilution method, 1113, 1744 microörganisms and, 685, 1404 ersey

lata,

187

for

ghts sible

171 riet; 494

500 ion,

1349 ater ater

ant 404,

nd,

388,

63

390 nd, Oxygen, di 1408, 1413

Synura and, 1404 taste and, distinction, 682 see Chlorination, taste and odor; Taste and odor Ohio; softening, increasing use of, 1364 water bills; assessment against property, 697 leakage, allowance and, law and, Oil waste; odor and, aëration and, 1405 Ont.; see Essex Border Ojibway, **Utilities Commission** Oklahoma City; meter corrosion, 1381 purification plant data, 1190 Olney, Ill.; manganese and, 1342 Omaha, Neb.; gas lines, Dresser couplings and, 1816 Metropolitan Utilities District, financing, 1919 purification plant data, 1190 Ontario Hydro-Electric Power Commission; pension system, 1951 Organic matter; removal by addition of activated carbon, 1397 see Coagulation; Iron; Manganese Osaka, Japan; water supply, 4 Ottawa, Ont.; accident prevention, ammonia-chlorine treatment, 271 emergency service, 1130 employees, superannuation, 1131 filters, master effluent control device, 1555 floc estimation by dissolved color method, 1422 pipe, cast iron, lead vs. compound joints, 1123 thawing, self-contained services. electric apparatus, savings and, waste reduction, 1125 Oxygen; solution, rate of; 65 seq., 1412 agitation and, 67 bubble vs. surface aëration, 67 formula, 65 temperature and, 66, 68 see Air; Gases; Oxygen dissolved

dissolved; aeration and,

aqueduct, increase in, 1412

microörganisms and, 1409, 1795 reservoir, impounding, depth and, 428, 432, 435, 1402, 1407

see Hot water system; Oxygen

content; factors, 135

normal, 62

oil waste and, 1405

Oysters; purification by placing in water free from pollution, 571 Ozone treatment; taste and odor and, 646

Pacific Northwest Section; 5th annual meeting, 1077
Panama Canal Zone; midge fly and, 668

Paper manufacture; manganese and,

Paratyphoid; animal pollution and, 1178

Paris, France; filters, early use of, 535 water supply; 19 early, 534

Parsippany-Troy Hills Township, N. J.; distribution system, flow tests, 1592 leakage, 1594

Pasadena, Cal.; distribution system, vacuum and, field tests, 1754 flushometer closets, siphonage tests, 1753

mains, dual, on wide streets, 1823 Plumbing Fixture Bd., creation of, 1756

services, 1823
water; light and power plant,
financial data, 1966
works, funds, control, 1914

works, funds, control, 1914
Passaic Consolidated Water Co.;
Little Falls plant, data, 1190
Pennsylvania; Delaware River diversion, Supreme Court decision,

1631, 1665, 1679
Permanganate; see Chlorination, taste and odor; Manganese removal; Taste and odor

moval; Taste and odor Phenol; adsorption by activated carbon, 642 oxidation, biological, pH and, 1748

see Chlorination, taste and odor Phenol determination; 1745 in coke plant effluents, 1746 error due to delay in examination, prevention, 1748

Fox-Gage method, 1747 Gibbs' method, modification; 1746 sensitivity and accuracy, 1747

Philadelphia, Pa.; consumption, 1980 mains, wooden, 543 metering, 1980 pipe, cast iron, early use of, 534 pumping engine, old, 544 purification plant data, 1190 taste, chlorine-ammonia and, 247 typhoid epidemic, cross-connection and, 1782 water supply history, 541

Philadelphia Suburban Water Co.; consumption, 995 Springton dam and reservoir, 995 Phosphate determination; see Boiler water Pinellas Water Co.; see St. Petersburg, Fla. Pipe; line; gravity, leakage, typhoid and enteritis outbreaks and, 1782 iron deposits, Crenothrix and, 103 manganese deposits in, 78 materials; cost, comparison, 360 selection, 357 seq. sun, exposure to, temperature and, whitewashing and, 1585 see Aqueduct; Main; Water hammer Pipe, brass; corrosion, carbon dioxide and, 1403 see Brass; Plumbing; Services ipe, cast iron; breaks; backfilling and, 1725 causes, 367, 1717, 1725 foundations and, 1717, 1725, 1729, 1731, 1735 defective pipe and, 1721 freezing and, 1721, 1733 frequency, 1722, 1727, 1735, 1737 minimizing, 1732 pipe handling and, 1726 pressure increase and, 1719, 1730 season and, 1733 temperature, stresses and, 1726 traffic vibration and, 1719, 1726 trench load and, 1730 water hammer and, 1722, 1727, 1730 y-laterals and, 1729 centrifugally spun; 1592 diameter, nominal and actual, 1593 coating; asphalt, 1588 bitumastic; 1587 enamel; centringan, plied, friction coefficient, apthickness, 1593 cement lining; cost, 364 first use of, 1863 proposed American tentative standard, 564 pitch base; 1587 friction coefficient, 1583 Smith's, Dr. Angus, 799 vitreous enamel, 1588 corrosion; soil, 347 tuberculation; 991 cement lining and, 1582 exposed iron and, 1583 geographical distribution in U. S., 1582

cost, 1850-1932, 1559 first installation in U.S., 534 joint; 1813 cement; 1814 repair, leak clamps and, 1813 Dresser couplings vs. Simplex, cost and, 1816 jute packing, colon bacteria and, 1062 lead; cast, 1814 hand vs. caulking, pressed air, cost and, 1123 vs. compounds; cost and, 355, pipe breakage and, 1124 wool, 1814 materials, leakage and, 95 mechanical, 1814 repair, leak clamps and, 1812 laying, cost, 263 lengths, 16-ft.; 1592, 1731 economy and, 1123 life of, 361, 534, 1722 line; carrying capacity, age and; 1599 steel and, comparison, 350 seq., 576 centrifugal, leakage, 1594 cost, compared with steel; 355 seq., 577 with Dresser joints, 1812 submerged; 801, 814 construction, 799 old, 49 seq., 534 specifications, sectional committee report, 562 thickness; 1731 resistance to impact and, 1731 see Electrolysis; Main; Pipe; Pipe coating; Pipe corrosion; Pipe flow; Pipe joint; etc. Pipe, cement-lined; caustic water and; coating and, 1866 dead ends and; 1862 flushing and, 1862 cleaning prior to lining, 1865 coating; gelatinous and, 1862 with tar, 1865 corrosion resistance, 363 seq. cracking and loosening; 1866 temperature, stresses and; 1585 whitewashing exterior and, 1585 cutting, 1864 and into dropping off trucks trenches and, 1863 early use of, 1583 fittings and, lining loosening, 1864

friction coefficient, 364, 1582

P

P

P

hardness of water, increase and; bituminous coating and, 1586 investigation of, 1583 lining thickness; 1861 determining, 568 metal condition under, 1862 mud deposits, attack and, 1863 service connection deposits and, 1862 smoothness, permanence and, 1862 sterilization with HTH, 1845 tapping, 1864 see Pipe, cast iron; Pipe, wrought iron Pipe coating; tests of, 365 wrapped pitch, and cost, 365 see Pipe, cast iron; Pipe, cementlined; Pipe, steel; Pipe, wrought Pipe, concrete; carrying capacity, centrifugal (Hume), manufacture, life, 361 seq. line; centrifugal (Hume); 332, 341 carrying capacity, 332 manganese deposits and, manufacture, 362 see Pipe Pipe, copper; annealing, 1827 manufacture, 1825 see Copper; Services Pipe corrosion; materials, comparison, 364 seq. tuberculation, carrying capacity and, 348, 363 see Electrolysis; Pipe cast, iron; Pipe, cement-lined; Pipe, steel Pipe flow; connections to main, reservoir or tank, type, influence of, 120 formulas; Scobey, 350 Williams-Hazen, 1590, 1594 friction coefficient, determination, 671, 1591 pressure drop, calculation, 119 pump pressure and horsepower required, calculation, 119 velocity; calculation, 118 head, calculation, 118 see Intake Pipe, galvanized; life, 361 zinc, solution of, carbon dioxide and, 1112 see Services

Pipe joint; cement, leakage and, 1818 Dresser couplings; life of, 1815

ute packing, B. coli and, 1783

lead substitutes, leakage and, self-

strength test, 1818

sealing and, 1817

leakage and, 1701 see Pipe, cast iron; Pipe, steel Pipe, lead; ancient, 532 life, long, instance of, 534 see Lead; Services Pipe locator; 1883 Pipe, steel; coating; asphaltum; 798 and coal tar, 803 unite, 331 Hermastic dip, 331 wrapping, Pabco, 331, 480 prosion; a mospheric, copper corrosion; addition and, 352 pitting, strei 7th and, 348 pits, repair b welding, 348 soil and; 347, 175 copper con ent and, 347 tuberculation, 1 11 jacking under pay ment, 1811 joints, electrolysis-proof, 331 life of, 349, 361, 576, 803 line; 19, 798, 803, 820 carrying capacity, age and, com-pared with cast iron, 350 seq., cost; compared with cast iron, 355 seq., 577, 1812 Dresser joints and, 1811 tees, etc., of cast iron and, 1812 leakage, 352, 366, 577 submerged, 804 welded; 330 seq., 479 carrying capacity, 332 reliability, 345 seq., 576 see Main; Pipe; Pipe coating; Pipe corrosion; Pipe flow; Pipe joint; Services; etc. Pipe, wood; log, early use of, 535, 543 stave, line, 800, 806, 813 Pipe, wrought iron; cement-lined, 798 coating, asphaltum, 798
see Pipe; Pipe coating; Pipe corrosion; Pipe flow; Services; etc. Piqua, O.; clarifier, 827 laboratory control, 829 softening, excess lime and recarbonation, 823 Pitometer; see Distribution system; Leakage; Main Pittsburgh, Pa.; manganese and, 1343 metering, 1981 Planorbis; see Snail Plumbing; fixtures; control board and, 1756 flow requirements, 1829 interference between, 1828 pressure required, 628 siphonage into supply and, 1750,

staining, iron and, 716, 1546 hot water pressure, boiler inlet and, 1833

piping, brass, galvanized fittings and, galvanic action and, 1825 requirements, minimum, 1754 vacuum and, tests demonstrating,

1756

see Tap; Water closet Point Grey, B. C.; see Greater Van-couver Water District

Pollution; air absorption and, 64, 1412

animal; dysentery and, 1312 paratyphoid and, 1178 typhoid and, 1276, 1312 indicators; chlorides and, 135

free ammonia and; 134 -albuminoid ammonia ratio and, 134

nitrites and, 135

intestinal disturbances notwithstanding purification, 1786 poisonous chemicals and, 1788 rats, jaundice and, 1791

see Disease; Water quality Pollution, industrial wastes; control, cooperation and, 638

see Oil Population; future, forecasting; 205 accuracy, 525

growth curves, form of, 1628 Port Arthur, Japan; consumption; water supply, 7

Port Coquitlam; see Greater Van-couver Water District

Port Moody, B. C.; water supply, 807 Portland, Ore.; consumption and financial data, 1158

Portsmouth, Va.; aeration, carbon dioxide removal and, 1413

Potassium permanganate; see Chlo-rination, taste and odor; Taste and odor

Potomac River; flow and water quality, drought of 1930 and, 73

Poughkeepsie, N. Y.; corrosiveness, aeration and, 1406

Power; see Electric; Hydro-electric; Steam

Pressure; fire, increasing for, 218 increase and, main failures and, 1719, 1730

practice, 218, 627, 1734, 1835 storage, elevated, and, 259

see Distribution system; Plumbing Princeton, Ind.; manganese and, 1342 Providence, R. I.; aeration, double, 1412, 1767

consumption, metering and, 524 corrosiveness, aeration and, 1406 filtration, rapid sand; 1770 sand cleaning, caustic soda and. 1771

lead solvency, lime treatment and. 1762, 1764

manganese and; 1349, 1350 laundry staining and, 1765 removal, iron and lime coagulation and, 1762

purification plant, data, 1190 red water; dead ends, bleeders and. 1763

iron and lime coagulation and, 1773

lime treatment and, 1763

water quality, 1774
Pseudomonas fluorescens; see Bacterium coli

Pseudomonas pyocyaneus; see Bac-terium coli; Bacterium coli test Publicity; value, 1183 Pulaski, Tenn.; manganese and, 1342

Pulaski, Pump; discharge valve closing time; automatic regulation, 487, 492 water hammer and, 95

packing, colon bacteria and, 1062. 1783

slip, 1706 Pump, centrifugal; 1120

on car running on inclined railway, 1166

rive; electric; costs, demand charge, pump sizes and, 57 seq. drive; 'electric; efficiency; checking, frequent, importance, 59 seq. decrease, grit and, 60

importance, 57 seq. maintaining, 58 seq. generator and, speed control by frequency variation, 1545

steam turbine, performance, 229

water turbine, 1544 purchase of, conditions and, 61 size required, determination, 60 water hammer and; 1132

air chamber and, 1138 fly wheel and, 1140 mathematical analysis and, 1133 relief valves and, 1138 stop-and-check valve and, 1138 surge tank and; 1138

Johnson differential, 1139, 1142

Pumping engine, steam; old, 544 Pumping station; cost, 342 seq., 492 discharge headers, design, 854, 857 drive; electric; 214 control, automatic, remote, 209 steam; vs. electric, cost and, 1896 first installation, 534 water power, 249 seq. fire protection hazards, 384

heating, oil burner and, 209 new, 209, 214, 327, 339, 487 power supply, unreliability, causes, trends 1120

see Storage

06

d,

d,

d,

d,

2

d

.

I

Punta Gorda, Fla.; iron removal, 1550 Purchasing; bureau and, 1130 inspection at point of manufacture,

see Contract; Specifications Purification; control; inadequate, typhoid outbreaks and, 1312 laboratory, 540, 829, 1127

nomenclature, suggestions re, 1416, 1438, 1440

plant operators, caliber, raising, 1025

trends, in foreign lands, 1 typhoid reduction and, 1780

Aëration; Chlorination; Filtration; Iron removal; Manganese removal; Softening; Storage;

Racine, Wis.; extensions, cost keeping and, 558

stock inventory, 557 Rahway, N. J.; prechlorination, residual reduction by aeration and, 1403

Railroad supplies; zeolite softening and, 1379

Rainfall; drought; long-time, San Francisco, 477

water supply and, 477, 545 of 1930; District of Columbia and, 77 Illinois and, 840

Maryland and, 1147 North Carolina and, 187 seq. water supplies and, 73 seq., 528, 840, 1786

Long Island and, 1523 Regina and, 241 Vancouver, B. C., and, 811 wheat, amount used by, 240 see Snow; Stream; Water, ground Rat; water pollution and, jaundice

and, 1791 Rates; Bangkok, 16 flat, fixture inspections, necessity

and, 1894

Greater Vancouver Water District (bulk), 821

increase, private supply development and, 96 Macon, Ga., 26

refrigerator, gas, and, 1892

service charge and, 218, 256 Soerabaja, street hydrant vending and, 15

stabilization, advisability, 1563 Troy, N. Y., 54

Walkerville-East Windsor Water Commission, 218 Watertown, N. Y., 256

Windsor, 218

see Fire protection; Valuation Rayon industry; water treatment, 1778

Reading, Mass.; iron removal, excessive aëration and, 1406

Reading, Pa.; coagulation, mixing and, 1425

Reconstruction Finance Corporation; Emergency Relief and Construction Act of 1932, text of, 1208

Records; see Distribution system;

Red water; see Corrosiveness Refrigerator; cross-connections and,

gas-operated; cooling water con-sumption; 1891 meter under-registration and,

1891

water rates and, 1892 Regina, Sask.; geology of district, 236

rainfall, 241 water supply investigation, 235 Reservoir; concrete; cost, 492

new, 491, 814 covered, slopes, washing and, prevention, 1881

covering, and, 1784 creosoted wood, taste

distribution, open, algae chlorine-ammonia and, 1177 filtered water; capacity tabulation,

1192 covering practice, 1192 pipe conducting polluted water through, hazard and, 1784

sedimentation basin adjoining, pollution hazard and, 1784 uncovered openings, pollution

hazard and, 1785 impounding; algae, stripping and, ancient, 530

area; -drainage basin area ratio, 851

and capacity curves, ground and aerial surveys, comparison, 407

-capacity ratio, 852 embankment; construction, 333 cost, 342 seq.

gunite lining, 333 evaporation loss; 426, 846

area-capacity ratio and, 852 microörganisms, depth and, 1407 new, 995

sealing, bentonite and, 336 sites; aerial mapping and, 398 seq., 408 selection, 848

stratification and, 1407 temperature, depth and, 1407 open, hedges and, 1883 pollution, leakage and, 1782 snail shells (Planorbis) in, 663 worms; red (Chironomus), in; 660,

covering and, 664, 666, 668 white, and, 665

see Carbon dioxide; Iron; Manganese; Oxygen dissolved; Pipe flow; Tank

Richmond, B. C.; see Greater Van-couver Water District

Richmond, Va.; prechlorination, residual reduction by aëration and, 1403

purification plant data, 1190 River; see Stream

Riverside, Ont.; see Walkerville-East Windsor Water Commission

Rochester, N. Y.; consumption, metering and, 524 iodization and, 1787

taste, permanganate and, 246 University, swimming pool; 1062 B. aerogenes, cotton rope and,

1063 Rocky Mountain Section; 5th annual meeting, 578

Rome (Ancient); baths of, 531 water supply, 530 Runoff; see Stream

Sacramento, Cal.; coagulation, mix-ing and, 1424, 1432, 1433 Saginaw, Mich.; mixing, 826 softening and filter plant and costs,

824 taste, activated carbon and, 824 Saint Cloud, Minn.; prechlorination,

657 taste; aeration and, 658 ammonia-chlorine treatment and,

carbon, activated, and, 658 Saint Joseph River; flow, 41 hardness, 41

watershed, 41 Saint Louis, Mo.; clarifiers, 827, 1460 consumption, 1715 emergency truck, lighting and, 1880 laboratory control, 829 leakage survey, 1714

metering, 1715 mixing basins, 826, 1460 pipe; cement-lined, 1863

steel, Dresser couplings and, 1811 purification plant, 823, 1190 sedimentation and coagulation basins, 1458

softening; cost, 823 soap saving and, 823, 1129

Saint Marys River; flow, minimum, 41 hardness, 41 watershed, 39

Saint Paul, Minn.; aëration, cost, 689 coagulation, mixing and, aëration and, 1434

odor removal; aëration and, 682 ammonia-chlorine and, 688 purification plant data, 1190 services, 1832

water supply, 683 Saint Petersburg, Fla.; leakage, water hammer and, 94 seq. water quality, 95 seq. water supply; new, 93

private supplies and, cross-connections and, 96

Salem, Ill.; manganese and, 1343 water supply, drought and, 848 Salem, O.; typhoid epidemic, 1782 Salem, Ore.; consumption and finan-cial data, 1158

Salinity; recorder, 330 Sampling; 1314 see Boiler water

San Francisco, Cal.; consumption, 481

rainfall data, 477 services, costs and, 1819

water supply; drought conditions and, 477

emergency connection to East Bay Municipal Utility District and, 479 San Gabriel Dam; see Los Angeles

County

Sand; see Filter sand

Sandwich, Ont.; see Essex Border Utilities Commission; Walkerville-East Windsor Water Commission

Sanitary survey; 1313 Santa Barbara, Cal.; water supply, drought and, 545 Screens; revolving, 220, 813 Seattle, Wash.; consumption and financial data, 1158 Sedimentation; ideal conditions for, 1444 plants employing, list of, 1192 theory, 1442 turbidity removal and, 106 Sedimentation basin; attendant and, 1461 baffles, harmful effect of, 1454, 1461 clarifier and; 1166, 1460 efficiency, 1167, 1460 retention period, 1167 sludge; pump and, 1167 recirculation and, 1167 water content, 1167 water loss and, 1167 covering and; 1457 columns, flow disturbance and, 1457 design; 1442 models and, 1443 dimensions, 1451, 1453, 1459 flow; dispersion, numerical expression of, 1448 observations; colored material and. 1447 sodium or ammonium chloride and; 1447 conductivity cell and, 1447 stratification, temperature and, 1455velocity and, 1446, 1453, 1459 inlet arrangements, 1455, 1459 number required, 1453 outlet arrangements, 1457, 1459 retention period, 337, 1454, 1459 roof drainage and, 1784 sludge; decomposition, taste and, 1785 removal, 1460 return from coagulation basin, 1460 storage volume, 1454 see Coagulation basin Seoul, Korea; see Keijo Services; brass, brittleness, corrosion and, 1826 cast iron, 1819, 1823, 1824 charging for, 30, 33 seq., 256, 624 connection, blocking of, cementlined pipe and, 1862 copper; 552, 1823 brittleness; 1825

nd,

460

880

811

as-

, 41

689

ion

ge,

on-

an-

on,

ns

ast

ict

les

er

le-

coiling and uncoiling and, installation, boring and, 1822 iron or steel, connection to, galvanic action and, 1826 corporation cock, protusion into main, advisability, 1827 depth, practice, 1011, 1823 flow volume; inquiries, handling, 626 unsatisfactory, causes, 625 galvanized iron, pitting, 1822, 1825 installation; in advance of demand, 32 seq., 633, 1823 cost; labor charges, 1819 pavement cutting and; 1822, 1823 vs. driving, 1819 driving, sub-surface structures, damage and, 1824 by plumber, 34 lead; deposits, electrolytic, 627 installation, boring and, 1822 leakage; 1703 detecting, 509 measuring, 1713 soil conditions and, 1820 statistics, 506 maintenance; cost, 1899 and replacement by utility; practice, 624 Wisconsin Commission and, 624 materials; capacity and; 629 age and, 630 costs and, comparison, 1819 leakage and, 514 practice, 255 multi-family, 1819, 1823 ownership, practice, 31 seq. pressure; losses; corporation cock and, 631 curb stops and, 631 material and, 631 meter yokes and; 630 gaskets and, 630 pipe cuts, reaming and, 633 stop and waste valve and, 631 low, causes, 627 size and, 1832 steel; galvanized; carrying capacity decrease and, 1825
pitting, 1822, 1825 installation, driving and, 1823 suction and, 18 thawing, electric, and cost, 1127 wrought iron, installation, driving and, 1823 see Pipe; Plumbing

Settling; see Sedimentation Sewage; pump priming connection, pollution of water supply through, 1752 treatment and disposal; activated sludge, aëration and, 71 payment for, sewer rental and, 903 works, scoring of, 1296 see Bacterium aerogenes; Bacterium typhosum; Water supply Sewer; storm overflow, automatic, 1551 Sewickley, Pa.; softening; cost esti-mates, 1373 zeolite, 1370, 1391 Shanghai, China; water supply, 8 Shelbyville, Tenn.; manganese and, 1342 Silica determination; see Boiler water Singapore; water supply, 9 Snail shells (Planorbis); in open reservoir, 663 Snow; Canadian cities and, 1011 see Rainfall Soap; consumption; climate and, 860 hardness and, survey, 859 waste; hardness and, 43 seq., 1129, 1364 softening, saving and, 823, 861, 1129, 1171 water used with, volume, 43, 1129 Society affairs; Annual Convention, 2025 California Section, 287 Canadian Section, 899 Central States Section, 141 Four States Section, 1232 Indiana Section, 737 Minnesota Section, 139 Missouri Valley Section, 281 Montana Section, 902 Pacific Northwest Section, 1077 Rocky Mountain Section, 578 Soda ash treatment; see Carbon diox-Corrosiveness; ide removal; Softening Sodium aluminate; see Coagulation; Color removal; Iron removal; Manganese removal; Softening Sodium citrate; see Bacteria, colon group Sodium silicate; see Corrosiveness Soerabaja; Van Kleef meter and, 14 water works, 14 Softening; base exchange; corrosiveness and, 1388, 1392 cost, 1373, 1388

iron and; 1393

removal and, 1370

solution of from rust deposits and, 1382 vs. lime-soda, 1370, 1387 manganese and; 1391 removal and, 1345 natural vs. synthetic zeolites. 1389, 1393 plants; automatic, 1382, 1389 cost, 1372 municipal, list of, 1368 regeneration, 1376 units; gravity vs. pressure, 1391 use as sand filters during emergency, 1370 wash water consumption, 1389, 1393 cost, 44 economy of, 44 filtration and; gravel cementation and, 1354 problems and; 1352 carbonation and, 1355 excess lime, carbonation and sludge stabilization and, 1356 pH of applied water and, 1355 sand; incrustation and; 1354 hardness removal economy and, 1354 sludge cake and; 1354 hosing surface prior to wash and, 1356 surface wash and, 1356 solution of, 1355 hardness; raw water, statistics, residual, practice, 44, 136, 207, 212, 823, 824, 825, 860, 1171, 1194, 1378, 1382 household units, number purchased per annum, 1367 laboratory control, value, 1389 lime; clarifier and, 211, 1114 cost, 823 excess; cost, 824, 825 plant cost, 824, 825 and recarbonation; 45, 823 hardness, residual and, 823 sludge return and, 825 soda ash and recarbonation; 1168 sludge return and; 1169 chemical cost, 1171 manganese removal and, 1766 microörganisms and, 1115, 1352 mixing period and, 45, 210 odor removal and, 1114 sludge return and; 212, 1114

m

pl

te

Soil

fr

8€

Sou

Sou

Sou

Sou

r

Spa

Spe

S

fi

1

V

t

Spi

Spi

Sta

Spe

Spr

Spr

la

algae and, taste and odor and, 1797 -soda; alum and, 888 clarifier and; 1371 detention period and. 1169 corrosion and, 1381 cost, 1373, 1388 manganese removal and, 1345 mixing and; 1424 period and, 1168, 1372 plant cost, 1373 sedimentation period, 889, 1372, 1378 sludge disposal; 1371, 1392 as fertilizer, 1371 sodium aluminate and, 888 taste and, carbon addition and, -zeolite, 825 municipal vs. household, 1367 plants; municipal, number in U.S., 822, 1364 prevalence, increasing, 822, 971 textile industry and, 1778 see Hardness; Lime treatment; Railroad; Soap; Water, ground Soil; corrosiveness, 365 frozen; depth and, 1016 perpetually, 1015 see Bacterium aerogenes; Bacterium anthracis; Bacterium typhosum; Clostridium welchii South Pittsburgh, Pa.; clarifiers, 827 laboratory control, 829 South Vancouver; water supply, 802 Southern Pacific Railroad; zeolite softening, 1379 Southwestern Bell Telephone Co.; rate case, 1954 Spartanburg, S. C.; filter runs, algae and, copper sulfate and, 729 Specifications; preparation of; 869 inspection, provision for, 871 standardization of, 867 Spokane, Wash.; consumption and financial data, 1158 Spring Valley Water Co.; tax case, 1973 Springfield, Ill.; odor removal; activated carbon and, 1116 softening and, 1116 taste and odor, ammonia-chlorine and, 247, 1116, 1789 Springton Dam; see Philadelphia Suburban Water Co. Sprinkler system; charge and, practice, 54

Staphylococcus; aureus, chlorine and,

multiplication in water; 572 fresh-water mussels and, 573 Staunton, Ill.; impounding reservoir data, 851 manganese and, 1343 Steam plant; power cost, compared with hydro-electric, load variations and, 1639 see Boiler Steel; see Corrosion; Pipe, steel; Services Sterilization; see Chlorination; Lime treatment Sterilizer; siphonage into water supply and, 1760 Storage; akalinity, caustic, increase, algae and, 107 carbon dioxide reduction and, 106 distribution; capacity, data, vari-ous plants, 1192 volume required, 1687 elevated; advantages, 1121 pump operation and, 1121 hardness and, 52 long period, 116 open basin, aëration and, 69 purification and, 116, 536, 1294, 1312 see Reservoir; Tank ream; flow; "average normal," Stream; flow; definition, 1659 comparisons, unit, weekly discharge per square mile and, 176 diversion; between drainage basins; 1623 number of states permitting, 1664 compensation and; 1631 in kind; 1653 examples, 1657 effects of; 1637 on stages downstream; 1637 formula, 1682 flood stages of re receiving stream and, 1645 legal aspects, 1628 methods, comparison, 1649 by pondage; 1643 computation, 1654 with reserve flow, 1650 drought, definition, 184 factors, 177 seq. gaging; in Maryland, 1149 in North Carolina, 172 seq low; average, definition, 183, 202 frequency, 186 minimum, in North Carolina, 171 records, long term, necessity of, 203

regulation by storage reservoirs, New York State law and, 1659 soil nature and, 198 temperature and, 177 seq. time of transit and, 1646 variations; between different basins, 196 seq. diurnal, evaporation transpiration and, 175, 177 vegetation, consumptive draft of, 178 reservation for future water supply needs, 1627 stage; -discharge relation, 1637 rainfall and, 1647 uses of, 1625, 1680 see Water resources; Water rights Streptococci; chlorine and, 1061 Stuart, Fla.; iron removal, gravel beds and, 1550 Sulfate; hydrogen sulfide production in distribution system and, 1793 Sulfur dioxide; see Dechlorination Sulfuric acid; manufacture, at water works, 272 see Coagulation Superior, Wis.; aëration, 1406 soap consumption, hardness and, survey, 859 Swimming pool; B. aerogenes; cotton rope and, 1063 significance, 1277 chlorination, residual required; 1061, 1062 B. coli and, 1062 pH and, 1054 streptococci and, 1061 cross-connections and, 1783 disease transmission and, 1791 recirculation rate, 1062 temperature and, 1063 Sydney, Australia; Neapean Dam construction camps, 14 water supply, 12 Synura; chlorination taste and, 244 taste and odor, aëration and copper sulfate and, 1404

Tacoma, Wash.; consumption and financial data, 1158

Tampa, Fla.; chlorination, taste and odor, ammonia and; 271
cost, 275
coagulation, alum and sulfuric acid, 272
corrosiveness, pH adjustment with lime and, 272
purification plant data, 1190
sulfuric acid manufacture, 272

water supply, 272 Tank; bacterial aftergrowths and, 273 elevated; altitude valve; 1006 closing time, hammer and. operations, record of, transmitting, 1007 control, automatic, 1005 freezing; circulation and, 1014 heating and, 1015 wooden roof, false and, 1015 heating equipment, 1006 steel; new, 259 large, 19 water level, transmitting, 1006 roof, siphonage or backflow from, 1783 surge, Johnson differential, 1139 wash water; 216 capacity and height tabulation, 1192 see Pipe flow; Storage Tansa Dam; see Bombay Tap; dripping, volume wasted and, 1708 Taste and odor; aëration and, 68, 72, 245, 639, 658, 887, 1404 bibliography, 654 carbon, activated, and; 247, 641, 823 seq., 974 filtration and; 890, 1740 installations, 643 rate and, 644 reactivation frequency, 644 woody taste in effluent, growths in carbon and, 1796 addition, and; 658, powdered, 824 seq., 829, 1396, 1740 cost, 658 number of plants employing, 643, 974 causes, 133, 242 seq., 637, 650, 1395 chlorides and, 135, 735 chlorination; ammonia and, 500, 641 657, 822 seq., 828, 890, 1173, 1360 pre-, and, 246, 641, 645, 1740 super-, and; 644, 975, 1740 and activated carbon filtration, 645, 975 after tastes and, 645 coagulation, iron, lime and chlo-rine, 735 seq. committee report, 1738 constancy, importance, 1788 dead ends and, 1400 filtration and; 639 idle filters and, 1785

flavoring, addition of, 1788

health and, 1112

im

m

0

p

S

8

t

t

2

8

Ta

Te

Te

T

T

T

T

importance, 1111 measuring; concentration by distillation and, 1742 method for, need of, 636, 1112, 1738, microörganisms and; 101, 497, 637, 1174, 1793 aëration and, 63, 245, 1325 Beggiatoa and, 63 carbon, activated, and; 642 powdered, addition; dosage and, 1175, 1397 particle size and, 1398 chlorination; ammonia and 500, 1175, 1325, 1328, 1739 pre-, and, 1798 super-, and, 246 depth of draft and, 1767 filtration and, 1799 organisms involved and treatment employed, list, 647 Synura and, 1404 ozonization and, 646 permanganate and, 246, 654, 975, 1740 recording, 636 sedimentation basın sludge decomposition and, 1785 softening; lime taste, carbon addition and, 829 sludge return, algae and, 1797 tolerance, absence of necessity for, treatment employed at various plants, list, 650 types reported, 636 wastes, industrial, causing, 637 zinc and, 1112 see Ammonia; Carbon, activated; Chlorination, taste and odor; Odor Taxation; income, federal, interest charges and, 1973 of municipally-owned works, 1164 in United States, data, 1914 Teeth; mottled enamel, drinking water and, 1787 fluoride in

273

ind.

ins.

015

ĥ

m.

on,

ıd,

23

t

d,

g,

15

11

see Chlorine absorption; Coagulation; Filtration, rapid sand; Microscopic organisms; Well Texas; waters of, manganese and, 78 seq.
Textile industry; water treatment and 1778

depth and, in impounding reservoir

Temperature; aëration and, 1408

Textile industry; water treatment and, 1778 Thomasville, Ga.; accounting and financing, 27 seq. Ticonderoga, N. Y.; water supply, 264 Tokyo, Japan; consumption; water works, 5 Toledo, O.; filter; runs, algae and, 1363

washing, double, benefits, 1361 purification plant data, 1190

Toronto, Ont.; B. coli tests, lactose broth, brilliant green bile and Dominick-Lauter broth, comparison, 1305

purification plant data, 1190 taste, superchlorination and dechlorination and, 246, 644

tunnel, filtered water, Johnson differential surge tanks and, 1141 Transpiration; see Rainfall; Stream Trench; excavation, 1122 Trenton, N. J.; purification plant

data, 1190
Troy, N. Y.; consumption, 54
metering, 54
rates, 54

rates, 54
reforestation, 53
typhoid, 1900-30, 54 seq.
water supply; history, 49
quality, 51 seq.

Tulsa, Okla.; purification plant data,

Tunnel; 811

Turbidity; in impounding reservoir water, depth and, 428, 433 nature of, 132

see Coagulation; Filtration, rapid sand; Microscopic organisms; Sedimentation

Turbidity determination; floc detector, 1422 silica standards, value variations,

1423 superimposed cover glass slide

method, 1422, 1439 Twin Falls, Idaho; chlorine-ammonia treatment, 1173

Typhoid; animal pollution and, 1276, 1312

deaths, monetary loss and, 1019 drinking from stream and, 1185 epidemics; carriers and, 1071 water-borne; chlorination, inade-

quate and, 1312 conduit, gravity, tile, leakage and, 1782 contamination during distribution and, 1311

cross-connections and, 1311, 1758, 1781 purification control, inade-

quate, and, 1312 Indiana, 1908 and 1931, 1019 New York State, 1900–30, 55 statistics; compiling, non-resident deaths and, 1066 large cities of U. S., in 1931, 1066 Troy, N. Y., 1900-30, 54 seq. Washington State, 1923-31, 1181 water purification and, 1780 well supply and, 1187 see Bacterium paratyphosum; Bacterium typhosum; Paratyphoid

United States; Government docu-ments, useful, 1867 taxation, data, 1914 United States Treasury Dept.; water quality standard; 1283 conformity with, degree of, 1285 development, 1281 wide use of, 2 Urbana, Ill.; see Champaign, Ill. Uric acid; see Bacteria, colon group Utica, N. Y.; water supply, West Canada Creek diversion agreements

United Railways and Electric Co.,

Baltimore; rate case, 1963

Valuation for rate making; depreciation, accrued, determining, 1961, 1968 "going concern value" and; 1958 measurement, 1959 overhead expenses and, 1956

rate base, definition, 1956 reproduction cost and; 1954 and historic cost, 1964 trends, recent, 1953

and, 1651

Valves; gate; closure; partial, wear and, 858

by vibration, 856 history, 677 inspection; 1875

frequency, 680, 855 size, smaller than main, 680 specifications, 677

operation, electric and air equipment, portable, 1876, 1879

see Distribution system
Valves, check; see Water closet
Vancouver, B. C.; see Greater Vancouver Water District Vancouver, Wash.; consumption and

financial data, 1158 Vitamines; water supply and, 1788

Voges-Proskauer; see Bacteria, colon

Walkerville-East Windsor Water Commission; pumping facilities, 217 rates, 218

services, hydrants and mains, freezing and, 1011 see Essex Border Utilities Commistion

Pa

col

pr

rai

rej

80

800 Wat

m

m

m

80

Wat

re

80

CS

B

ch

co

fa

ir

p

T

8

Wa

C

8

Wa

i

W

Wat

Wate

Walla Walla, Wash.; consumption and financial data, 1158 Wapakoneta, O.; zeolite softening,

1370, 1382 Warrentown, N. C.; corrosiveness:

lime treatment and, 723 iron removal plant; 716 cost, 720

results, 721 Washington, D. C.; coagulation, acid and clay addition and, 74 seq. phenol tastes, ammonia and, 75 seq. prechlorination, 76 purification plant data, 1190

water supply, drought and, 73 seq. Washington, State of; chlorination, filtration plants, 1180 typhoid and infant diarrhea, 1923-31, 1181

water supply treatment, regulations re, 1179

Washington Suburban Sanitary District, Md.; red and white worms in reservoir, etc., 665 Waste; causes, 1700

faucet, dripping and, volume and, 1708

house to house inspection and, 516, 523, 1125 prevention, importance, 1124

survey and, 220 see Consumption; Leakage Water; dissociation, 985, 988

use, unauthorized, 1705, 1707 Water analysis; 1867 interpretation, 132

"Standard Methods," statement re, 1609 Bacteriological examination;

Microscopical examination Water closet, flushometer; siphonage into supply and; 1750

check valves and, 1753, 1757 tests demonstrating, 1753 vacuum breaker and, 1760 see Plumbing

Water cost; 1188 Cleveland, 1361 New York City, 1979 Pacific Northwest cities, analysis,

volume produced and, 1160 Water, gratuitous; 1895 Griffin, Ga., 35

Pacific Northwest cities, 1161 Water, ground; irrigation water per-colation and, 1689 prospecting for, 235 seq. rainfall percolation, factors, 240 replenishing, "spreading grounds" and, 1689 softening during flow through natural zeolites, 1547 see Infiltration gallery; Well Water hammer; bibliography, 1145 main failures and, 1722, 1727, 1730 mathematical analysis, 1133 misconception of, 858
see Leakage; Pump; Pump, centrifugal; Tank Water measurement; volume units, relationship, 176 see Meter; Stream Water quality; B. aerogenes, significance, 1269 B. coli; significance, 138, 1269 standard and, 138 chlorides, limit and, 135 color, amount noticeable, 132 copper; health and, 731 limit and, 731 factors, unusual, 1780 iron, limit and, 137 physical, constancy, importance, Treasury Dept. standard; 1283 conformity with, degree of, 1285 development, 1281 wide use of, 2 see Chlorination, taste and odor; Odor; Pollution; Purification; Taste and odor; Water analysis; Water resources; conservation, 1625 control, in U. S., 1659 see Stream; Water rights; Water supply Water rights; British Columbia and, interstate streams, Supreme Court decisions, 1631, 1663, 1676 reasonable use and, 1630 riparian, 1629, 1679 see Stream; Water resources Water supply; ancient, 529 control, state, 1179 drought and, 73 seq., 477, 528, 545, 840, 1786 frost, perpetual, and, 1016 history, 529 rating, numerical; 1288

bibliography, 1296 regional, 1149

sewage reclamation and, 1786

Z-

18-

on

g,

d

Į.

8

sources, data, 875, 1148, 1181 surveys, aerial mapping and, 397 in U.S., industrial utility of, 1867 vitamines and, 1788 volume, safety factor and, 528 see Fire insurance; Fire protection; Purification; Stream; Water, ground; Water resources; Water rights; Water works; Well; etc. Water unaccounted for; 1884, 1898, 1901 analysis, 1707 average in U.S., 521 Baltimore, 521 expression as percentage, accuracy, Fall River, Mass., 521 Griffin, Ga., 29 Indianapolis, 1707 Kenosha, Wis., analysis of, 507 Lynchburg, Va., 521 Manila, 11 meter ownership and, size and, 514 St. Petersburg, Fla., 95 statistical analysis, 513 Wisconsin cities, 505 see Leakage Water works; beautification, 1880 betterment, need of, 1564 conventions, value of, 725 cost, Pacific Northwest cities, analysis, 1157 employees; accident prevention program, savings effected by, 1129 insurance and, 26 organization and, 1119 superannuation and; 1131, 1937 examples, 1942 plans in operation, classification, 1941 floods, protection and, 1850 insurance rates, fire and life, and, 1579 life span and, 1579 literature, Governmental, relating to, 1867 materials and labor costs, changes in, 1558 number in U.S., 1850-1924, 1559 officials, tenure of office and, 1025 output, metering of, importance, 59 reports, annual, 282 service field orders, handling, 394 seq. turn on and off service, 833
see Administration; Extensions; Financing; Fire protection; Inquiries; Materials; Purification; Valuation; Water supply; etc.

Waterford, N. Y.; coagulation; air jet conditioning and, 1438 alum and acid, 1431, 1438 laboratory mixing apparatus, 1439 Watershed; access; by permit only, Widal test requirement and, 818 area determination, aerial mapping and, 398 forest and, water quality and, 426 forestation, 53, 537 ownership, 818 pollution, animal, and, 1178 population, resident, pollution hazard and; 1293 distance from intake and, 1294 protection; 537 ownership and patrol of, inadequacy, 1179 see Stream Watertown, N. Y.; consumption, 256 filters, 253 metering, 255 pitometer survey, 255 rates, 256 services, 255 water supply; 253 financial data, 258 history, 249 Weiser, Idaho; filter plant, 1173 taste and odor, chlorine-ammonia and carbon treatments and, 1174 Well; abandoned, plugging, 879 ancient, 529 artesian, new, 547 casing corrosion; 1524 prevention, 880 collecting system, tunnel, 1541 construction; easing; 370, 879, 1529 perforating, 371, 1535 riveted, 378, 879 welded, 379, 1535 contamination, prevention and, 1519 deep, in sand, 1512, 1523 diameter, selection, 369, 375, 380, 1536 drilling, rotary hydraulic, 1519 specifications, 877 strainers and, 1517, 1520 on distribution system, 1684 drainage, construction, 376 drawdown, 1516 dug, concrete walls, waterproofing of, 882 flood protection and, 1853 gravel wall; construction; 239, 372 contract, penalties and, 1527 rotary drilling; 1527

vs. standard cable tool. 374 specifications, 1525 cost, 1531 new, 550 operating cost, 1532 vs. plain well; 372 yield and, 373 iron content, high, air access and. 1550 loss during construction and operation, causes, analysis, 1534 new, 93 pollution; 1537, 1782 garbage reduction waste, impounded, and, 266 typhoid and, 1187 pumping; air lift; 1540 carbon dioxide removal and. 1413, 1547 deep well turbine; efficiency loss, sand and, 1510 history and development, 1499 impulse type, 1504 mixed flow type, 1507 performance characteristics, 1503 reaction type, 1506 ground water level lowering and 1514 salting and, 3 site; cesspool or privy, distance and, 878 selecting, 876 sewers, distance and, 878 sterilization, chlorine and, 881, 1521 temperature, depth and, 1546 yield, increasing; 1521 back blowing and, 1521 see Water, ground Wenatchee, Wash; consumption and financial data, 1159 West Frankfort, Ill; impounding reservoir data, 851 water supply, drought and, 849 West Palm Beach, Fla.; aeration, double, 1412 coagulation, aeration and, 1405 corrosiveness, aeration and, 1406 West Palm Beach Water Co.; home beautification, encouraging, 1897 West Vancouver, B. C.; water supply, 806 Water Greater Vancouver District West Virginia; streams, manganese and, 1342 Weston, W. Va.; manganese and, 1343

Wilmin

Winds

data

pum

rates

serv:

see I

Winne

fite

sedi

Winns

Winon

prac

cros

506

Wisco

po

810

Wilmington, Del.; purification plant data, 1190

Windsor, Ont.; metering, 220 pumping facilities, 218

rates, 218

ol,

d,

8-

1-

1

services and meters, freezing of, 1011 see Essex Border Utilities Commis-

Winnetka, Ill.; dechlorination, bisulfite and, 645

sedimentation basin sludge decom-

position, taste and, 1785
Winnsboro, S. C.; main extensions,
practice, 32
Winona Lake, Ind.; typhoid epidemic,

cross-connection and, 1782

Wisconsin; consumption statistics, reduct when by impounds garyes and, and
yes and a such
article and
convert to the bondon sales
convert to the bondon sales
convert to the bondon sales
convert to the sales contection
mathems sale
convert to the sales and collection
conditionated and the sales and
convert to the sales and convert
the sales and convert and
convert to the sales and restricted
the sales and convert and
convert to the sales and restricted
the sales and convert and
the sales and convert and convert and
the sales and convert and convert and
the sales and services, maintenance and replace-ment, Public Service Commission and, 624

water unaccounted for, statistics, 505

Worms; white (Sagomyia Plumi-cornis), in water supply, 667 see Chironomus; Reservoir

Yakima, Wash.; consumption and financial data, 1158 Yokahama, Japan; water works, 6 Youngstown, O.; corrosion of hot water piping, 1381 purification plant data, 1190

Zinc; taste and, 1112 see Pipe, galvanized

AUTHOR INDEX

ALFKE, C. J., material control policies, 2000
ALLEN, T. H., see Lanham, W. G.
ANGILLY, C. E., installation and maintenance of gate valves, 677
ANGUS, R. W., the flow of water in pipes, 118
AND TABLES B. water softening by

APPLEBAUM, S. B., water softening by

zeolite in municipalities, 1364
Armstrong, J. W., history of water supply with local reference to Baltimore, 529.

Babbitt, H. E., glimpses of foreign

water works, 1
Bahlman, C., larval contamination of a clear water reservoir, 660

Bankson, E. E., relief from downward trend in water revenues, 1893

BARNUM, E. K., the Chenery Project, California, 325 BAUERMANN, J. F. D., ammoniation in the Newark water supply, 494 BAYLIS, J. R., taste and odor elimina-

tion, 635
BEAN, E. L., see Craig, E. C.
BECKER, C. H., meeting of the Four

States Section, 1232 BERRY, A. E., vegetable growths in

water supplies, 97 12th annual convention of Canadian

Section, 899 BIRKINBINE, J. L. W., the merits of steel pipe for water mains, 345

Blakesley, A., factors determining well diameter and casing, 375

Blum, L. D., interest during construction, 1970 Booth, G. W., the influence of water

works on fire protection classification, 1569 BOYNTON, P., AND CARPENTER, L. V.,

manganese and its relation to

filters, 1341
Brown, H. H., elevated storage in
Milwaukee, 259

Bruhn, J. A., see Niemeyer, H. W. Brush, W. W., changes in cost of water works labor and materials,

Buice, W. A., see Ellison, G.

Burgess, P., cast iron pipe for transmission and distribution of water supplies, 357

E

F

F

F

F

G

G

V

G

G

G

G

F

F

E

H

discussion, steel pipe, 575 Buswell, A. M., see Hudson, H. W.

CAIRD, J. M., the Troy water works.

VERT, C. K., contamination of ground water by impounded gar-CALVERT. bage waste, 266

25th annual meeting of Indiana Section, 737 CALVERT, J. T., the London water

Supply, 110

CARPENTER, L. V., see Boynton, P.
CHAPIN, C. K., billing and collection methods, 830

CHASE, E. S., numerical rating of

public water supplies, 1288
CLEVELAND, E. A., the water supply
of Greater Vancouver, 795

CONANT, D. J., turbine well pumpstheir history and development, 1499

CONATY, A. J., inventory and stock control, 553 CRAIG, E. C., BEAN, E. L., AND SAW-YER, R. W., iron and lime in removal of manganese, 1762

CUNNINGHAM, F. G., AND DONALDSON, W., the Memphis water supply, 1539

CUNNINGHAM, J. W., observations on utility finances and accounting, 1152

Daniels, F. R., objectionable features commonly found in water works systems, 382

Donaldson, W., see Cunningham, F. G.

Dunwoody, J. S., pension for water works employees, 1937

ELIEL, L. T., aerial maps aid water surveys, 397

ELLISON, G., HACKLER, H. W., AND BUICE, W. A., effects of age and storage temperatures storage temperatures on growth of bacteria in water samples, 895 ESPY, T. W., meeting San Francisco drought conditions, 477

FAUDE, F. M., cost keeping and bud-

get control, 277
FERGUSON, H. F., see Klassen, C. W.
FINCH, R. M., Minnesota Section
meeting, 139
FINDLAY, R. E., administration and
financial problems in Georgia—

Macon, 22

ans-

ater

. W.

rks,

1 of

gar-

iana

ater

P.

tion

of

pply

ent,

ock

AW-

re-ON,

oly,

on

ng,

ea-

ter

m,

ter

ter

14

ND

nd

95

FLENTJE, M. E., report of committee on control of tastes and odors, 1738

FOOTE, H. B., 7th annual convention of Montana Section, 902

Frisk, P. W., the elimination of manganese in reservoirs, 425

GAYTON, L. D., the effect of sizes and maintenance of meters on reve-

nues, 1983 GERBER, W. D., the drought of 1930 and surface water supplies in Illinois, 840

VAN GIESEN, I. D., corrosion in neutral waters, 984

GLENN, E., see Moon, M. P. GOLDSMITH, C., distribution distribution system facts and fancies, 854

GORMAN, A. E., see Reynolds, M. B. GOUDEY, R. F., water purification ODEY, R. F., water purification outside of California, 822

GREEN, E. W., 12th annual convention of California Section, 287

Hackler, H. W., see Ellison, G. Hale, F. E., present status of aera-tion, 1401

HALEY, H. J., the Watertown water

system, 249 HALL, R. B., AND SMITH, S. H., the selection and operation of centri-

fugal pumps, 57 WSEN, P., unsuspected, unusual and little known factors in water

supply quality, 1780
HARDIN, E. A., design and operation data on large rapid sand filtration plants in the United States and

Canada, 1190 HECHMER, C. A., Chironomus in water

supply, 665
Hoffman, M. F., the stub plan of customers' accounting, 692

HORTON, R. E., water diversion between drainage basins, 1623

Howard, N. J., water analysis, its interpretation and relationship to water purification, 132

comparison of results with standard lactose, brilliant green bile and Dominick-Lauter broths, 1305

Howson, L. R., Cedar Rapids water softening and filtration plant,

recent trends in factors affecting the rate base, 1953

HUDSON, H. W., AND BUSWELL, A. M. soap consumption and water quality, 859

Hughes, W. P., purification of Snake and Clearwater Rivers, 1173 Hurlbur, W. W., expansion of the

Los Angeles distribution system, 1684

HURTGEN, P. J., unaccounted for water, 505

JACOBS, E., see Wichers, C. M. JAGGER, J. E., construction and operating records of plant facilities, 1922

Jessen, F. W., manganese bacteria in the waters of Texas, 78 see Williams, O. B.

Jones, M. S., water well casing, 378 Jordan, F. C., twenty-five years in retrospect, 1018

JORDAN, H. E., brilliant green bile for coli-aerogenes group determinations, 1027

Keis, F. J., the artesian water supply for the Latham Water District, N. Y., 547

Keith, J. C., winter operation of water works systems, 1009 Kelly, E. M., the Boulder City,

Nevada, water works, 1165
KEPNER, D. E., 5th annual meeting
of Rocky Mountain Section, 578
KILLAM, E. T., friction coefficient tests on cast iron distribution mains with centrifugally applied bitumastic enamel lining, 1590

KLASSEN, C. W., AND FERGUSON, H. F., sanitary specifications and construction for water wells, 875

Laase, W. F., construction and maintenance of deep wells in sand strata on Long Island, N. Y., 1523

LABOON, J. F., the filtration plant and station at Lockport, pumping

N. Y., 483 Lane, D. A., the loss of wells in construction and operation, 1534

LANE, F. W., the new water supply for St. Petersburg, Florida, 93

LANGELIER, W. F., the theory and

practice of aeration, 62 LANHAM, W. G., AND ALLEN, T. H. construction and maintenance of deep wells in sand strata, 1512

LAUTER, C. J., the effect of the 1930 drought on the Washington water

supply, 73
LAWLOR, F., see Thompson, S. A.
LAWRENCE, W. C., further experience

with high rate of filter wash, 1358 LEAHY, H. W., cotton guard rope in swimming pools as source of colon-aerogenes group, 1062

LECHNER, B. J., 33rd meeting of Central States Section, 141
LYLES, J. E., use of ammonia at

Tampa water purification plant,

MABEE, W. C., breaks in cast iron pipe gridiron systems, 1717

MACDONALD, W. E., operating economies in water works systems,

Mallmann, W. L., hydrogen-ion con-centration in disinfection by chlorination, 1054

MARQUIS, J. K., copper sulfate as an algicide, 728

McCurdy, H. S. R., the Springton dam and reservoir, 995

McNamee, R. L., the new Fort Wayne

water supply, 36
McQueen, A. W. F., water hammer and surge tanks, 1132

Moon, M. P., and GLENN, E., freshwater mussels and the bacterial content of water, 571

MORRILL, A. B., sedimentation basin research and design, 1442

Morris, S. B., cross connections with public water supplies, 1750

Morrow, D. C., effect of maintenance of meters on revenues, 1976 Mower, C. M., Jr., discussion, un-

accounted for water, 1231 MUEGGE, O. J., see Warrick, L. F.

Nelson, F. B., underground waste detection as a factor in the New York water conservation program, 1709

NEWELL I. L., nomogram for the eval-uation of pH, alkalinity and carbon dioxide in water, 560

NIEMEYER, H. W., AND BRUHN, J. A., pressure losses in customers' services, 623

NIGHTINGALE, H. W., chlorination of water supplies in the State of Washington, 1178

S

S

T

Noble, R. E., see Tonney, F. O.

Poe, C. F., the correlation of the cellobiose test for the colon-aerogenes groups, 891 POWELL, H. P., administration and

financial problems in Georgia-Griffin, 29

PRINGLE, D. R., administration and financial problems in Georgia— Thomasville, 27

RANDLETT, F. M., the standardization of specifications for materials and equipment, 867

RAY, C. E., JR., minimum flow of North Carolina streams, 171 REDDICK, H. G., see Stokes, D. B. REYNOLDS, M. B., AND GORMAN, A. E.,

progress toward filtration in Chicago, 965

RICHARDSON, C. G., developments in metering and controlling equip-

ment, 1551 RIDER, J. H., value of water works conventions to plant operators, 725

RITTER, C., the presumptive test in water analysis, 413

RUMMEL, J. K., control tests for the treatment of feed and boiler water, 2004

RUPARD, H., instrument and contro. equipment for an elevated storage tank, 1005

SAWYER, R. W., see Craig, E. C. SCHWARTZ, J., guarantee payment of

water bills, 1994
Schwier, E. C., budgetary control of expenses, 1904

Siems, V. B., improvement reserves for leveling financial peaks and valleys, 1911

Skinner, A. E., causes of waste in distribution systems, 1700

SMITH, S. H., see Hall, R. B. SPALDING, G. R., experience with activated carbon, 1394

SPAULDING, C. H., some quantitative odor determinations, 1111

filter problems and water softening, 1352

STAPLETON, J. E., mechanical billing and posting, 387

STOKES, D. B., AND REDDICK, H. G., linings for cast iron pipe, 1582

STRICKLAND, G. H., the water supply of the Essex Border District,

SYMMS, M., "tuning in" on your consumer, 1183

TARBETT, R. E., conformity of public water supplies to the United Treasury Department States standard, 1281

TAYLOR, A., gravel envelope versus

standard wells, 369

n of

0

llones

and

a-

and

a-

ion

and

of

E.,

hi-

in ip-

ks

T8,

in

he

ler

0. ge

of of

ıd in

h re

g

THOMPSON, S. A., AND LAWLOR, F., performance of small turbo cen-

trifugal units, 229
Thuma, R. A., aeration with compressed air for removing odors, 682

Tonney, F. O., and Noble, R. E., colon-aerogenes types of bacteria as criteria of fecal pollution, 1267

TRACE, V. E., meeting emergency drought conditions in Santa Barbara, California, 545

TRICE, M. F., the new iron removal plant at Warrentown, N. C., 716

VENTRE, E. K., coagulation with lime and chlorine, 733

WARNER, C. F., Everglades domestic water supply, 885

WARRICK, L. F., AND MUEGGE, O. J., taste and odor removal, 242

WATERMAN, E. L., 17th Missouri Val-

ley Section meeting, 281
Weir, P. L., water treatment at
Atlanta, Georgia, 105
Wells, J. P., the water supplies of

LeRoy and Ticonderoga, N. Y., 262

WHEELER, R. C., the cost of false

economy, 128
WHITAKER, O. C., have our meter reading sections overlooked an opportunity?, 392

WHITMAN, E. B., per capita water consumption, 515

WICHERS, C. M., AND JACOBS, E., granulometric test for sand, 705

WILLARD, E. C., 5th annual meeting of Pacific Northwest Section, 1077

WILLCOMB, G. E., floc formation and mixing basin practice, 1416 WILLIAMS, O. B., AND JESSEN, F. W., oxidation of manganese by bac-

teria, 88 Wilson, C., care of public water sup-

plies, 1311 biological control as affecting plant

operation, 1792 WILSON, E. K., trunk main surveys,

WOLMAN, A., the water resources commission of Maryland, 1147

WYNNE-ROBERTS, R. O., underground water supplies of Regina, 235

INDEX TO ABSTRACTS

I. AUTHORS

Adams, F. P., 1240 Adams, J. C., 1493 Adams, O., 1492 ADLER, O., and ADLER, R., 913 ADLER, R., 1088 see Adler, O. Aitken, P. W., 1089 Alexander, W. H., 472 Alsberg, J., 305 Amiss, T. L., 942 Anderson, H. B., 964, 1494 Anderson, W. F., 961 Andrew, R. L., 918 Andrew, R. L., 918
Andrews, J. R., 1254
Angus, R. W., 322
Anselmi, S., see Manuelli, C.
Appel, T. B., 607
Applebaum, S. B., 1486, 1488
Archer, E. T., 1494
Armstrong, J. W., 771, 1100
van Arnum, W. I., 953
Atkin, W. R., see Thompson, F. C.
Auerbach, J., 909
Augener, H., and Lohmann, H., 60 AUGENER, H., and LOHMANN, H., 606 AYRES, L. E., 744 AYYANGAR, K. V. N., see KING, H. H. AZADIAN, A., 170, 322, 786 Babbitt, H. E., 150, 296, 584, 591, 596, 744, 1241, 1464 BACH, H., 784, 1107 BACHELDER, W. H., 585 BACHRACH, E. W., 774 BACON, G., 322 BADGER, C. H., 1091 BADGER, E. F., 792 BADO, A. A., and TRELLES, R. A., 1087
BAHLMAN, C., 945, 953, 958
see Evans, E. B.
BAKER, C. M., 790, 1265
BALDWIN, F. O., 930 BALL, E. B., 1477 BAMBERGER, J. M., 318
BARDWELL, R. C., KNOWLES, C. R., and Southcott, J. R., 2047

BARDWELL, R. C., and WESLEY, J. B.,

315

ABEL, 1255

ACKERMAN, A. J., 1239

Adams, B. A., 169, 614, 615, 940, 1249

BARDWELL, R. C., et al., 2046 BARNES, M. F., 596 BARRETT, R. J., 923 BARROWS, H. K., 950
BARRY, C. E., 762
BARTLETT, M. C., 921
BARTOW, E., and PERISHO, F. W., 2040 2040 BARTOW, E., and THOMPSON, H., 1472 Bartow, E., and Hompson, H., 1472
Bartow, E., and Weigle, O. M., 2040
Bassel, B. A., see Hays, C. C.
Bastin, E. S., and Greer, F. E., 746
Bauer, O., Vogel, O., and HoltHaus, C., 1621
Baylis, J. R., 318, 450, 461, 468, 470,
608, 609, 610, 926, 944, 945, 1252,
1487, 1613 1487, 1613
BEAL, R. B., and STEVENS, S., 613
BEALE, J. F., see THRESH, J. C.
BEAM, R. C., 317
BEAM, R. D., 1486
BEATTIE, J. M., 2037 BEBBINGTON, A., 927 BECK, W., and v. HESSERT, F., 1621 BECKWITH, T. D., and ROSE, E. J., BECKWITH, H. E., 787 BEGBIE, R. S., and GIBSON, H. J., 931 BEGER, E., see KOLKWITZ, R. BEGER, H., 757 BEHRE, A., CHRISTLIEB, H., and KONGEHL, M., 906 BEHRMAN, A. S., 310 BEHRMAN, A. B., see STERLING, C. I. BELL, H. K., 1248
BELL, W. H., 932
BENSON, H. K., and BENSON, W. R., 2039 Benson, W. R., see Benson, H. K. Berliner, J. F. T., 321 Berliner, J. F. T., and Howe, A. E., 617, 1098 BERNARD, A., see GRIFFON, H. BERNARD, A., see GRIFFON, H.
BERRY, A. E., 446, 581, 1807
BEYER, A. C., 1483
BIGGS, G. W. JR., 145
BILADEAU, C. W., 582
BILLINGS, L. C., 1495
BINGHAM, C. F., see MESSER, R.
BISSELL, D. L., 445

 BLA

BLA BLE BLE BLI BLO

BLO

Bon

BOE

Bor

Boi

Bos Bos Bos

Bot

Boy

Bo

Box Br. Br. Br.

BR BR

BR

BR BR BR BR BR

BR

BR

Br Br Br

Bu

Bi

B

BBB

B B

BBB

B

E

E

I

BLACKWELDER, C. D., 1468
BLAIR, E. M., see WILSON, W. J. BLAKISTON, R., 159 BLANKINON, R., 1953 BLENKINSOP, A., 1803 BLEYER, B., and SCHWAIBOLD, J., 314 BLINCOW, O. E., 1478 BLOK, C. J., 303, 1083 BLOMMENDAAL, I. H. N., see NICOLAI, BOARDMAN, H. C., 2044 BODENBENDER, H. G., 1107 BODENBENDER, H. G., 1107
BODNAR, J., and STRAUB, J., 463
BOHN, J. L., 1620
BOLBERITZ, K., see JENDRASSIK, A.
BOLE, R., 954
BORUFF, C. S., and STOLL, K. E., 2039
BOSCH, H. M., see PETERS, H. D.
BOUSON, F. W., 618
BOUSQUET, 915 Bousquet, 915 Bowie, E. H., 145 Bowie, E. H., 145
Boyton, P., 464
Bozza, G., and Secchi, I., 308
Bradley, H. H., 960
Brady, F. L., 911, 912
Bradn, H. J., 914
Brede, R., 308
Britton, H. T. S., 170
Britton, S. C., see Evans, U. R.
Broll, H. R., 2037
Brown, C. A., 964
Brown, H. G., Jr., 1249
Brown, H. H., 943
Brown, J. M. D., 305 Brown, J. M. D., 305 Brown, R. H., see Roetheli, B. E. BRÜCHE, R., see SATTLER, G. BRUNS, H., 1105, 1486
see WILLFUHR see Krüsmann BRUSH, W. W., 611 BUCH, K., 1235 BUCHANAN, J. H., see NELSON, G. H. BUCHLER, W., 942 BÜHRING, O., 311 Bull, A. D., and Metcalf, A., 964 Bull, A. D., and Mull, A., 963 Bumbacher, J., Jr., 601 BUNAU-VARILLA, P., 1490 BUNDESEN, H. N., 1266 BURCHARD, E. D., 1809 BURDICK, C. B., 149, 448, 585, 1092, BURKE-GAFFNEY, H. J. O'D., 1481 BURKHOLDER, J. L., 1240 BURTT, A. W., 1475 BUSH, W. E., 2038 BUSWELL, A. M., 294, 2043 see Mason, W. P. Butcher, R. W., Pentelow, F. T. K., and Woodley, J. W. A., 322, 785 BUTLER, F. W. W., 311

72 10

Cady, L., 1808
Calvert, H. T., see Robertson, R.
Cameron, A. T., 583
Cameron, D. H., 603
Camp, T. R., 145
Campbell, J. T., 616
Cannen, J. V., 616
Cand, H. S., 619
Carey, F. C., 582
Carlisle, O. B., and Kennedy, D. CARLISLE, O. B., and KENNEDY, D. E., 1480 CARMICHAEL, D. C., 1236 CARPENTER, E. E., and LEONARDON, E. G., 580 CARPENTER, L. V., 464, 467, 927, 1252 CARY, W. H., 761 CASLER, M. D., 747 CAZALA, see CLOGNE, R.
CEREDI, A., see OTTOLENGHI, D.
CERNY, J., 601
CERNY, V., 597
CHANDLER, H. C., 1097 CHAPDLER, H. C., 1097
CHAPIN, R. H., 762
CHAPPELL, E. L., 753
CHASE, E. S., 456, 1244
CHIAUDANO, S., 1086
CHINN, B., see RUCHHOFT, C. C.
CHOLODNY, N., 603
CHEISTLANSEN, I. E. and TELLM CHRISTIANSEN, J. E., and TEILMAN, I. H., 751 CHRISTLIEB, H., see BEHRE, A. CIANCI, V., 913 CLAGGETTE, A. D., 955 CLAGGETTE, A. D., and ROLLINS, F. L., 464 CLARK, A. E., 609 CLARK, A. T., 1481 CLARK, H. F., 776 CLARK, H. W., 780 CLAY, C. M., 1491 CLEMENT, R. C., 466 CLEMENT, R. C., 466
VAN CLEVE, R., see THOMPSON, T. G.
CLEVELAND, H. B., 607, 930
CLINE, R. C., and LEWIS, D. E., 922
CLOGNE, R., COURTOIS, A., and
CAZALA., 1800
COATES, W. S., 905
COCHRUN, E., 1265
COCKERELL, T. D. A., 605
COGHLAN, S. F., 750
COHEN, C., 1496
COHN, M. M., 318
COLEMAN, G. S., 1477
COLLINS, C. W., see PROUTY, W. L.
COLLINS, C. W., see WALKER, J. H.
see WHITE, A. H. see White, A. H. Collins, W. D., Foster, M. D., REEVES, F., and MEACHAM, R. P., COLUMBIA, J. Z., 618

Commentz, C., 912
Comstock, C. W., 1491
Condra, G. E., 1614
Consoer, A. W., see Older, C.
Consoer, G. O., 1265
Cooper, E. A., and Nicholas, S. D., 924, 1088
Copeland, W. R., 792, 1265
Corey, R. H., 931
Correll, M., 474
Couch, A. D., 770
Coulter, E. W., see Ruchhoft, C. C.
Courtois, A., see Clogne, R.
Cover, G. W., 1475
Cox, C. R., 320, 2042, 2043
Cox, G. L., and Roetheli, B. E., 315
Cranch, E. T., 157
Crane, H. B., 472
Crohurst, H. R., 1265
Cronk, E. I., 786, 1095
Cullen, E. J., 317
Cumming, H. S., 1095
Culliffe, R., 790
Cunningham, J. W., 776, 920
Cunningham, M. B., 964

Dameron, J. H., 1085
Dangeard, P., 913
Daniels, P. S., 964
Darden, W. A., 959
Darling, E. H., 761
Dasek, V., 597
Dashiell, W. N., see Flickwir, A. H.
Davenport, G. L., 2047
Davenport, G. L., Jr., and Knowles
C. R., 315
David, see Sisley, P.
Davidson, J. H., et al., 2046
Davidson, J. H., et al., 2046
Davidson, J. R., 1250
Davis, J. G., 157
Decelle, O. A., 1496
De France, H., 620
De Kok, W. J., see Pieters, H. A. J.
Denes, G., 906
Denison, I. A., 169, 1085
DeWaal, J. W., 921
Dewell, H. D., Ellms, J. W., and
McDonnell, R. E., 746
DeWitt, C., 444
Dicklin, R. G., 932
Diederich, P., 779
Diénert, F., 159
Diénert, F., 159
Diénert, F., 159
Divine, F. E., 907
Dixey, F. 1491
Dixon, G. G., 1243

DOBBIN, R. L., 1240

Dohe, R. C., 964
Doland, J. J., 297
Donaldson, W., 1809
Dorle, M., see Ziegler, K.
Dornedden, H., 1087
Dorsch, K. E., see Probst, E.
Dougaas, A. H., 1494
Dowd, J. E., 1089
Drewry, M. K., 1473
Dugger, E. F., 788, 1492
Dunn, C. L., and Pandya, D. D., 619
Dupont, G., 1472

FINE FINE FINE

FITZ FLA FLE FLE

FLE

FOL

Foo

FOR

For For

For For Fre

FRE

FRE

FRI

FRI

FRI

FRO

FRO

Fu:

GA

GA

GA

GA GA GA GE

GE GE GE

GE

GE

GI

GI

VA Gr Gr

Gi Gi

EARL, G. G., 1264
EBERLE, C., 755, 909
EBERT, M., 774
EDDY, H. P., 585, 1265, 2045
EGG, C., and JUNG, A., 1235
EGGER, F., 1258
EGGER, T., 1090
EIFFERT, C. H., 743
EISENBRAND, J., 602
ELDRIDGE, E. F., 295, 772, 1090, 1109
ELDRIDGE, E. F., and MALLMANN, W. L., 460
ELLIS, D., and STODDART, J. H., 916
ELLIMS, J. W., 1244
see DEWELL, H. D.
ELLMS, J. W., et al., 1080
ELROD, H. E., 1096
ELROD, H. E., 1096
ELROD, H. E., and CUMMINS, R. J., 744
ENDO, H., and KANAZAWA, S., 1469
ENSLOW, L. H., 759, 760, 1088, 1237, 1247, 1809
VON ESTREICHER, T., 1086
ESTY, R. W., 949
ETCHEVERRY, B. A., 1492
EUHLING, E. A., 619
EVANS, E. B., and BAHLMAN, C., 955
EVANS, U. R., and BRITTON, S. C., 918
EVANS, W. A., 790
EWING, S., 1084

Fair, G. M., 1244
Fair, G. M., Whipple, M. C., and Hsiao, C. Y., 947
Farber, J. E., and Youngburg, G. E., 2039
Farrel, M. A., and Turner, H. G., 941
Fash, R. H., 1494
Fawcett, E. A. S., 1250
Feeney, A. J., 467
Fenkell, G. H., 321, 1264
Ferguson, G. H., 1096
Ferguson, H. F., 452
Fickley, J. B., see Stratton, R. C.
Fiedler, A. G., 460, 611
Filby, E. L., 1495

Findlay, R. E., 321
Fink, G. J., 461
Fink, G. J., 461
Fink, G. J., 461
Fink, G. J., 461
Finneran, G. H., 949
Fitzgerald, R. W., 788, 929, 1493
Flanders, R. L., 964
Fleming, G. H., 1482
Fleming, J. D., 600
Flentje, M. E., 465
Filckwir, A. H., and Dashiell, W. N., 1494
Folpmers, T., 1257
Foote, F. J., 2041
Fores, R. D., 468
Foster, M. D., see Collins, W. D.
Foulk, C. W., 461, 473
Foulk, C. W., and Hansley, V. L., 2041
Foutz, C. C., 596
Fowler, K. D., 1495
Fox, E. J., et al., 301
Freeman, D. B., 593
Freeman, J. W., see Leahy, H. W.
Freise, F. W., 757
Freundlich, H., and Söllner, K., 309
Fricke, R., and Meyring, K., 914
Friedberger, E., and Hahsimoto, H., 915
Friend, R. O., and Partridge, E. M., 302
Frisbie, W. S., 164
Froboese, V., 304
Frost, W. H., 791
Fuller, G. W., 1262
Fuller, H. V., 317, 946

19

1.

Gage, S. Dem., 761
Ganapati, S. V., 789, 2048, 2049
Gardiner, J. H., 961
Gardner, H. H., 1809
Garlinger, E. G., 1096
Gates, F. L., 314
Gayton, L. D., 291
Gelpi, A. G., Jr., see Mallman, W. L.
Gelston, W. R., 1101
Genter, W. A., 615
Gest, A. P., 618
Gettrust, J. S., 953
Gettrust, J. S., sand Hostettler,
C. O., 954
Geupel, L. A., 791
Gibbons, M. M., 947
Gibson, H. J., see Begbie, R. S.
Van Gilder, L. W., 949
Gilkison, G. F., 471
Gill, S., and Rogers, W. F., 1237
Gillespie, C. S., 1085
Ginter, R. L., 746
Giral, J., 1802
Glace, I. M., 468

Godfrey, E., 166
Goehring, E. C., 616
Goffey, A., 166
see Hammond, F. W.
Gordon, J., 1083
Gorman, A. E., 470
see Wolman, A.
Gottschalk, A., see Springborn, A.
Goudey, R. F., 923
Grant, J., 619
Gray, W. S., 1491
Green, C. H., 781
Green, C. H., 781
Greer, F. E., see Bastin, E. S.
see Tonney, F. O.
Van de Gren, M., 147
Greve, F. W., 297
Grey, W. J., 317
Griesbach, W., 1239
Griffin, A. E., 945, 948
Griffon, H., and Bernard, A., 1470
Grime, E. M., 2047
Grime, E. M., and Neville, E. C., 2048
Grimley, K. W., 607, 756, 929
Gross, D. D., 580, 1465
Grünwald, A., 1470
Guarnier, P., 1621
Gunning, T. P., 458
Günther, H., 905
Gustafson, H., see Kean, R. H.
Guy, L. T., 598

Haase, L. W., 605, 758, 767, 1106, 1478

Haase, L. W., 605, 758, 767, 1106, 1478
Hack, J. G., 757
Hacker, T. W., 1099
Haddaway, J. E., 468
Haendeler, 1467
Hahn, F. L., 1469
Hahsimoto, H., see Friedberger, E.
Hale, F. E., 595, 769
Hall, 917
L. Hall, A. J., 921
Hall, R. B., and Smith, S. H., 321
Hall, R. E., 461
Hammond, F. W., and Goffey, A., 1476
R, Hancock, J. S., 907
Hanley, J. P., et al., 2046
Hanna, F. W., 296, 775
Hanna, F. W., and Kennedy, R. C., 1491
Hansen, P., 144, 1242
Hansley, V. L., see Foulk, C. W.
Harmon, W. A. S., 1467
Harris, C. W., 749
Harrold, L., see Mitchell, W. D.
Harry, R. G., 935, 940, 1805
Hart, G., 161

HARVEY, H. W., 616 HASSLER, F. R., 964
HASSLER, F. R., 964
HATCH, B. F., 1090
HATTON, T. C., 1265
HAUPT, 766
HAUPT, H., 1105 HAUPT, 700
HAUPT, H., 1105
HAWORTH, J., 160
HAYS, C. C., and BASSEL, B. A., 1497
HAZARD, J. O., 925
HAZEN, A., 770, 932
HEARSEY, G., 161
HECKMANN, W. R., see TILLMANS, J.
HEDGEDETH, L. L., 461 HEGGEPETH, L. L., 461 HEGGES, E. S., 614, 1621 HEFFERNAN, D. A., 949 HEFFERNAN, P., 908 HEINE, 167 HEINZE, H., 1489 HELLER, V. G., and LARWOOD, C. H., 913 913
HELLWIG, C. A., 1085
HENDERSON, J. M., 322
HENLE, E., 1471
HENNING, K., 449, 593
HENNY, D. C., 1082
HEPBURN, E. A., 1094
HERNDON, L. K., 467
HERRMANN, E., 299
V. HESSERT, F., see BECK, W.
HETHERINGTON, H. A. P., 456
HETHERINGTON, R. G., 165 HETHERINGTON, R. G., 165 HETZER, M., 465 HEUKELEKIAN, H., 608 HEWER, D. G., see LOCHHEAD, A.'G Hewson, G., 1091 HEYWOOD, H., 1802 HIDDEMANN, K., 168 HILL, H. E., 1620 HILL, N. S., JR., 448, 755 HILL, R. A., 777 HINDERKS, A., 764 HINDS, J., 610 HIRSCH, P., 800 TILLMANS, J. Hirsch, P., see Tillmans, J.

Hirschegger, A., 1083

Hirschegger, A., 1083

Hirschecock, L. B., 787

Hitchings, H., see Thompson, T. G.

Hodges, W. W., 464

Hofer, K., 160, 905

Hoffmann, W., 1470

Höjer, J. A., 912

Holbrook, A. R., 1243

Holloway, E. R., 153

Holmes, J. A., 447, 744, 747, 1089

Holmes, J. D., 776

Hivengar, M. O. T., 599

Jackman, A., and Howell, E., 910

Jackson, D. C., 1101

Jackson, F. W., 298

Jackson, T. H., 746

Jaenicke, 911

Jaenicke, M., 1258

Jalowetz, E., 303

Jander, G., see Rother, E.

Jarvis, C. S., 1079

Jendrassik, A., and Bolberitz, K.,

1253 Holmes, J. D., 776 Holmes, R. L., 316, 2047 HOLTHAUS, C., see BAUER, O.
HOLTHAUSEN, W., 1620
HOLWERDA, K., 153, 604, 1470, 1471
JENKS, H. N., 296, 7
JENKS, H.

HÖLZERMANN, 753 HOOTMAN, J. A., and NELMS, W. S., 1468, 1614 HOOVER, C. P., 293 HOPKINS, E. S., 468, 1096, 1622 HOPKINS, E. S., and McCall, G. B., 1256 Hori, S., see Hasegawa, K. HORLÜCK, A. D., see KULLERUD, G. HORNER, W. W., 301 HOROWITZ-WLASSOWA, L. M., 1090 HORTON, R. E., 936 HOSTETTLER, C. O., see GETTRUST, HOSTETTLER, C. O., see GETTRUST, J. S.
HOUGH, W. A., see STRATTON, R. C.
HOUSER, G. C., 948
HOUSTON, A. C., 473, 1617
VAN DER HOUT, O. H., see Mom, C. P.
HOWARD, C. S., and LOVE, S. K., 583
HOWARD, N. J., 148, 588, 1251
HOWE, A. E., see BERLINER, J. F. T.
HOWELL, C. H., 745
HOWELL, E., see JACKMAN, A.
HOWSON, L. R., 1243, 1486
HOYT, J. C., 773
HOYT, K. K., 449
HRASKY, J. V., 601
HSIAO, C. Y., see FAIR, G. M.
HUBER, P., 603 HSIAO, C. I., SEE FAIR, HUBER, P., 603 HUIZENGA, L. S., 1095 HULBERT, R., 163, 454, 617 HÜLSMEYER, C., 307 HUME, E. E., 919 HUTTENLOCH, G. M., see VAN VOOR-HEES, F. M. HUTTON, S., 2037

JE Jo

Jo

Jo

Jo

Jo

Jo

Jo Jo

Jo Ju

Ju

K K

K

K

K

K Kı Kı Kı Kı Kı

Kı Kı Kı

K

K

K

K

K K

K K

K K

K K K K ve V

K K

ILLING, E. T., see Wood, D. R. IMBEAUX, E., 619 IMBODEN, J. I., 467 IMHOFF, K., 314, 619, 1093, 1245 IMMERSCHITT, E., 165 IVEKOVIČ, H., 1801 IYENGAR, M. O. T., 599

1253 JENKINS, P. M., 605 JENKS, H. N., 296, 753, 775, 777

Jewell, A. B., 925, 963
Johnson, E. C., 922
Johnson, H. A., 787
Johnson, R. N., see Wolfsperger, E.
Johnson, W. M., 788
Johnson, W. S., 963, 1092
Johnston, W. A., 1241
Jones, H. E., 940
Jones, T. A., 2041
Jordan, L. A., see Vernon, W. H. J.
Jumper, C. H., 1253
Jung, A., see Egg, C.

S.,

В.,

ST,

P.

83

T.

R-

KADLEC, J., 1468 KALLAS, J. G., see RUCHHOFT, C. C. KANAZAWA, S., see ENDO, H. KAR-KADINOWSKY, see UGLOW, W. A. KATHE, 307 KATSAMPES, C. P., see LEAHY, H. W. KAUFMANN, W., 1491
KEAN, R. H., and GUSTAFSON, H., 1254 1294
KEHAR, N. D., see SINTON, J. A.
KEHL, R. J., 1490
KEHN, R. W., 760
KEISER, K., 757
KELEN, N., 1491
KELLEY, C. E., and Loss, I. R., 1248
KENDALL, V. V., and SPELLER, F. N.,
614 614 KENNEDY, D. E., see CARLISLE, O. B.
KENNEDY, R. C., see HANNA, F. W.
KENNISON, K. R., 766
KENT, D. W., 302
KESSLER, W., 465
KHAN, S., 1804
KERSEREN, W. 600 KHAN, S., 1804
KIERSTED, W., 600
KILLAM, S. E., 949
KIMBERLY, A. E., 1096
KIND, W., 1468
KING, H. H., RAGHAVACHARI, T. N.
S., and AYYANGAR, K. V. N., 1260
KING, W. F., 791, 1262
KIRCHMAN, W., 465
KIRCHNER, E., 769
KLASSEN, C. W., 771
VON KLINCKOWSTROEM, C., and VON VON KLINCKOWSTROEM, C., and VON MALTZAHN, R., 620 VON KLINCKOWSTROEM, C., VON MALTZAHN, R., and MARQUARDT, E., 620 KLUT, H., 907, 1490 KNAPPEN, T. T., 1247 KNAYSI, G., 464 KNAYSI, G. and GORDIC Knaysi, G., and Gordon, M., 464 Knowles, C. R., 299, 315, 2044, 2048 see Bardwell, R. C.

see Davenport, G. L., Jr.

KNOWLES, C. R., TALLYN, L. L., and SOUTHCOTT, R. J., 315 KNOWLES, M., 150 KNOWLES, M., 150 KNOWLTON, W. T., 1089 KNOX, S. F., 765 KNUTH, F. H., 616 KOCH, P., see MIEHR, W. KOEPPEL, P., 1259 KOGAN, A. I., 759 KOLINSKY, A. 763 KOLINSKY, A., 763 KOLKWITZ, R., and BEGER, E., 766 KOLTHOFF, I. M., 1237 KOLTHOFF, I. M., and PEARSON, E. A. 2039 KONGEHL, M., see BEHRE, A. KONRICH, F., 304, 769 KOYL, C. H., et al., 2046 KRATZERT, J., see MIEHR, W. KRAUSE, H., 1091 KRAUSS, F., 1472 KRING, H., 766 KROKE, R., see ORNSTEIN, G. Ккотн, Н., 964 Ккиц, W. F. J. M., 302, 921 Кким, Н. J., 616 KRUSMANN and BRUNS, H., 1086 KÜHNE, K., 306 KÜHR, C. A. H. VON WOLZOGEN, 767, 934 KULLERUD, G., and HØRLÜCK, A. D., Kunesh, J. F., 777 Kuo, G. L., 1468 Kurtz, E. B., 619 see WINFREY, R. Kyriasides, K., 785, 1806 LABOON, J. F., 1242, 1243

Laboon, J. F., 1242, 1243
van Laer, M., 912
Lagaard, M. B., 1090
Lain, T. L., 1497
Lambert, A., 594
Lambert, C. F., 148, 945
Lane, E. W., 297, 743
Land, A., 926, 1615
Lantz, E. M., see Smith, M. C.
Larson, J., 961
Larwood, C. H., see Heller, V. G.
Lawrood, C. H., see Heller, V. G.
Lawroud, C. H., 962
Laybourn, R. L., 600
Leahy, H. W., Freeman, J. W., and
Katsampes, C. P., 1473
Lee, H. W., 1262
Lee, L., 473
Leibig, G. F., see Tonney, F. O.
Leick, J., 1259
Leipert, T., 915
Leisen, T. A., 1466

LEITCH, R. D., 1099, 2042 LEITCH, R. D., YANT, W. P., AND SAYERS, R. R., 1615 LEITNER, N., 309 LEMAIRE, E., 2045 LEMARCHAND, G., 1489 LEONARDON, E. G., see CARPENTER, E. E.
LESSA, G., 463
LEVINE, M., see NELSON, G. H.
LEWIS, C. H., see TRAVERS, J. T.
LEWIS, D. E., see CLINE, R. C.
L'HOIR, G., 1469
LICHTHEIM, 767
LIDDLE, J. C., 312
LIEBREICH, E., see MAASS, E. E. E. LIEBREICH, E., see MAASS, E. LIESCHE, O., 1086 LINDEMANN, E., 1801 LINDEN, H., and Schwarz, F. K. T., 1479 LINES, R., 962 LINK, E., 1254 LOCHHEAD, A. G., and HEWER, D. G., LOHMANN, H., see AUGENER, H. LOHMANN, W., 1086 LONG, V. V., 963 LONGWELL, J. S., 749 LORAH, J. R., 471 LOSS, I. R., see KELLEY, C. E. LOVE, S. K., see HOWARD, C. S. LOWTHER, B., 775 LUACES, E. L., and STROHM, T. W., 466 LÜERS, H., 311 LUIPPOLD, G. T., 922, 1616 LUNDE, G., 1087 LURMAN, H., see TILLMANS, J. LYLES, J. E., 163 LYNCH, H. B., 777, 1491, 1613 Maach, H. W., see Spring, L. W. Maass, E., and Liebreich, E., 910, 1803 MACAULEY, F. W., 455
MACKENZIE, J. K., 786
MACKEY, G., 919, 1097
MAHON, R. L., 1481
MALAN, P. S., 298
MALCOMSON, A. S., 610
MALCOR, M., 307
MALLMANN, W. L., see ELDRIDGE, E. F. E. F. MALLMANN, W. L., and GELPI, A. G.,

JR., 594, 917

MANAHAN, E. G., 1465 MANDEL, B. K., 2037 MANGUN, L. B., 471

VON MALTZAHN, R., see VON KLINCK-OWSTROEM, C.

Mantell, C. L., 1236, 1803
Manuelli, C., and Anselmi, S., 1472
Margaria, R., 758
Marquardt, E., see von Klinckowstroem, C.
Marquis, J. H., 321
see Simms, R. B.
Marshall, E. A., 300
Marshall, L. W., 779
Marston, F. A., 949
Marting, P., 917
Martiny, P., 1489
Mashl, S., 1237
Masing, G., 1469
Mason, W. P., and Buswell, A. M., 788 788 788
MASSINK, A., 604, 1106
MATHEWS, C. K., 472
MATHEWS, G. F., 963
MATHIEU, M., see ROSENTHAL, D.
MATSUSHITA, S., see TSURU, K.
MATTE, H. P., 152
MAUK, J. E., 964
MAXWELL, D. H., 944
MAYER O. 934 MAYER, O., 934
MAZZOCCO, P., 912
McCall, G. B., see Hopkins, E. S.
McCants, J. M., 1479 McCants, J. M., 1479
McCarrison, R., 913
McCaustland, E. J., 469
McCollister, C. D., 909
McCormack, G. R., 1248
McCrumb, F. R., see Taylor, W. A.
McDonnell, R. E., 772, 960, 1100
McGrew, W. R., 1808
McInnes, F. A., 949
McKillop, V. A., 598
McLean, H. J., 442
McNamee, P. D., see Theriault,
E. J. E. J. McNamee, R. L., 620 MCPHEETERS, W. H., 963
McWane, J. R., 947
MEACHAM, R. P., see Collins, W. D.
MELKON, B., 1801 MELKON, B., 1801
MENDELSOHN, I. W., 452, 608, 944
MERKEL, E., 1087
MESSERT, R., WAGNER, A., SNIDOW,
H. W., and BINGHAM, C. F., 782
METCALF, A., see BULL, A. D.
MEYER, A. F., 1804
v. MEYEREN, G., 906
MEYRING, K., see FRICKE, R. V. MEYEREN, G., 906
MEYRING, K., see FRICKE, R.
MICHELUCCI, A., 1089
MIEHR, W., KOCH, P., and KRATZERT,
J., 1083
MILES, W. J., 1497
MILLARD, H. B., 586, 934
MILLER, A. A., see UGLOW, W. A.
MILLER, A. H., 1240

MI

MII MII MII

MII

Mr

Mo Mo Mo Mo

Mo

Mo

Mo

Mo Mo

Mo Mo Mo

Mo

Mo Mo Mo

Mu Mu

Mu Mu

Mu

Mü Mu Mü

Mu Mü Mu

Na Na

NE

NE NE NE NE NE NE

NE

NE

NE

Nic

Nic

Nic

MILLER, C. F., 463
MILLER, H. C., 1616
MILLER, J. H., 312
MILLER, R. B., 941
MILLER, R. C., see THOMPSON, T. G.
MILLIGAN, E., see WILLCOX, R. L.
MITCHELL, W. D., and HARROLD, L., 593
MOHLMAN, F. W., and RUCHHOFT, C. C., 793
MOH, O., 936
MOM, C. P., 1236
MOM, C. P., 1236
MOM, C. P., and VAN DER HOUT, O. H., 924
MONTGOMERY, J., 1494
MONTGOMERY, J. G., 1494
MONTGOMERY, P., 776
MONTOULIEU, E. I., 615
MOONE, H. B., and NEILL, R. G., 918
MORAWE, K., 303, 310
MOREY, E. E., 963
MORGAN, L. S., 1466
MORSE, F. P., 585
MORTON, C., 934
MOSCRIP, R. P., 962
MOSES, H. E., 618
MOWRY, C. W., 949, 1252
MUCHKA, J., 743, 908
MUDREZOVA-WYSS, K., see NIKITINSKII, I.
MUHLENBACH, see SCHMIDT
MULDER, W., 939
MULL, A., see BULL, A. D.
MÜLLER, F., 1469
MULLIGAN, M., 780
MÜNCH, M., 909, 1620
MUNROE, W. C., 147
MÜNZ, W., 1802
MURPHY, L. D., 460

72

ζ-

Nachtigall G., 1258
Nattijsen, H. L., 768
Neal, E. H., 144
Nealy, J. B., 942
Needham, L. W., 910
Neill, R. G., see Moore, H. B.
Nelms, W. S. see Hootman, J. A.
Nelson, G. H., Levine, M., and
Buchanan, J. H., 2041
Neu, E., see Tillmans, J.
Neumann, H., 1084
Neville, E. C., see Grime, E. M.
Newell, F. H., 748
Nicholas, S. D., see Cooper, E. A.
Nicloux, M., 1468
Nicolai, A., and Blommendaal,
I. H. N., 310
Niehaus, F., 1106

Nikitinskii, I., and Mudrezova-Wyss, K., 905 Noetzli, F. A., 742 Noftzger, L., 295 Norcom, G. D., 944 Norman, I. L., 2038 Nothall-Laurie, D., 612 Nuebling, E. L., 941

O'CALLAGHAN, J. P., 303
O'CONNOR, P. J., 957
OEFVERBERG, 1806
OGURA, T., 1614
OHLMÜLLER, W., and SPITTA, O., 1489
VAN OLDENBORGH, J., and OTHERS, 1807
OLDER, C., and CONSOER, A. W., 747
OLIVER, J., 1265
OLSZEWSKI, W., 1089
ONSLOW, D. V., 314, 1084
OPATRNY, A., 598
ORNSTEIN, G., 939
ORNSTEIN, G., and KROKE, R., 1084
O'ROURKE, C. E., 296
ORR, J. B., 937, 1490
ORTH, W., 1236
OTTEMEYER, W., 1084
OTTOLENGHI, D., and CEREDI, A., 302
OVERHOLT, V., see RAMSOWER, H. C.

Paine, G. G., 292
Palmaer, W., 619
Pandya, D. D., see Dunn, C. L.
Parker, A., 935
Parker, F. Y., 295
Parker, J. H., see White, A. H.
Parker, L. T., 162, 454, 462, 765, 941,
943, 1095, 1099, 1100, 1488
Parkerson, W., 959
Parks, E. H., 595
Parr, S. W., 1490
Parr, T., 595
Parr, S. W., 1490
Parridge, E. M., see Friend, R. O.
Partridge, E. P., see White, A. H.
Paschke, B., 1805
Paterson, A. V., 917
Paul, C. S. T., 936
Pearson, E. A., see Kolthoff, I. M.
Pentelow, F. T. K., see Butcher,
R. W.
Pepler, G. L., 306
Perisho, F. W., see Bartow, E.
Perkins, C. E., 964
Perkins, H. F., 1085
Perkins, R. G., see Welch, H.
Perry, E. S., 764
Petters, H. D., and Bosch, H. M., 472
Petternko, S. N., see Uglow, W. A

PFLANZ, E. L., 1487
PIATTI, L., and SPRECKELSEN, O., 1086
PICK, H., 308
PIERCE, J. F., 462, 584, 1251
PIETERS, H. A. J., and DE KOK, W. J., 768
PIOTROWSKA, H., 162
PIRNIE, M., 443, 1242
PLUMLEY, S., 619, 1490
POLLOCK, A. K., 744
PORTER, J. W., 1497
POTTER, A., 157, 943
POWELL, H. P., JR., 321, 582
PRATT, A. H., 770
PRINGLE, D. R., 321
PRIOR, J. C., 458, 472
PROUTY, F. H., see PROUTY, W. L.
PROUTY, F. H., see PROUTY, W. L.
PROUTY, F. H., 619
PRÜSS, M., 1107
PRUTHI, H. S., 1249
PUCKHABER, F. H., 1496
PULS, L. G., 1083

QUAM, G. N., 1236 QUICK, R. S., 1083

RAGHAVACHARI, T. N. S., see KING, H. H.

RAINWATER, J. E., 156
RAMSOWER, H. C., and OVERHOLT, V., 458, 473
RANDOLPH, R. I., 793
RANSOME, F. L., 1082
RASMUSSEN, I. L., 747
RAWLINGS, I. D., 791, 1265
RAYMOND, J. W., JR., 293
READ, H. K., 1483
REEVES, F., see COLLINS, W. D.
REICHOW, W. C., 2047
REID, E. F., 1474
REITH, J. F., 921
REMY, E., 915
REQUARDT, G. J., 318
RICH, E. D., 2041
RICHARDSON, B., 1081
RICHARDSON, B., 1081
RICHARDSON, H. K., 1094
RICKARD, T. A., 1491
RIDENOUR, G. M., 923
RIDDLE, R. F., 959
RIKER, I. R., 762
RISSEL, E., 909
RITTER, C., 926
ROBERTSON, A. G., and WRIGHT, W. H., 911
ROBERTSON, G. A., 928

ROBERTSON, R., and CALVERT, H. T., 313 ROBINSON, D. W., 1497 ROBINSON, R. L., 928 ROBORGH, J. L., 2036 ROETHELI, B. E., see Cox, G. L. ROETHELI, B. E., and BROWN, R. H., 315 ROETHELI, B. E., and Cox, G.L., 1254
ROGERS, G. F., 1085
ROGERS, W. F., see GILL, S.
RÖHRER, F., 1615
ROKITA, W., 308
ROLLINS, F. L., see CLAGETTE, A. D.
ROLLINS, W. B., 314
ROMWALTER, A., 914
ROSE, E. J., see BECKWITH, F. D.
ROSENHEIM, A., 302, 303, 305, 310 ROSENHEIM, A., 302, 303, 305, 310 ROSENTHAL, D., and MATHIEU, M., 1621 ROSENTHAL, H., 1496 ROSSON, H. J., 775 ROTHER, E., and JANDER, G., 1801 ROULE, L., 1801 ROWLAND, L., 150 RUCHHOFT, C. C., see MOHLMAN, F. W. RUCHHOFT, C. C., KALLAS, J. G., CHINN, B., and COULTER, E. W., 2040 ZU40 RUDOLF, Z., 597 RUDOLFS, W., 467 RUEHL, E. H., 787, 1251 RUFF, C. F., 764 RUSSELL, G. S., 472 RUTHERFORD, R. L., 1615 SACHER, J. F., 1620 SACKETT, R. L., 151 SAGASTUME, C. A., and SOLARI, A. A, 915

SISI

SI

SE

SE

SE

SE

SH

SE

SI SI

Si

SI

SI SE SL

SA

SM

SM

SM

SM SM SM SM SM

SACKETT, R. L., 151
SAGASTUME, C. A., and SOLARI, A. A
915
SALLE, A. J., 785
SALVATERRA, H., see SUDA, H.
SANFORD, S. A., 303
SARDZITO, M., 1088
SARKER, J. N., 918
SATTLER, G., and BRÜCHE, R., 167
SAUERBREI, E., 1470
SAUERBREI, E., 1470
SAUERS, C. G., 154, 1484
SAUNDERS, J. T., 601
SAVA, A., 1620
SAVILLE, C. M., 456, 599
SAVILLE, T., 449
SAXTON, R. G., 961
SAYERS, R. R., see LEITCH, R. D.
SCARRITT, E. W., 1467
SCHAAFSMA, N. D. R., 1484
SCHAEFFR, H. F., 468
SCHAUT, G. G., 906
SCHEIBER, J., 909

Scheringa, K., 1471
Schikorr, G., 1800
Schilling, K., 1259
Schipper, J. E., 1095
Schlenz, H. E., 1497
Schmidt, L., 964
Schmidt, R., 1805
Schmidt, R., 1805
Schmidt, R., 1805 SCHMIDT and MUHLENBACH, 937 SCHNEEBELI, J., 301 SCHNEIDER, W. G., 946 SCHOEPFLE, O. F., 956 Schoepfle, U. F., 956 Schwarden, J., see Bleyer, B. Schwarz, E., 1469 Schwarz, F. K. T., see Linden, H. Schweizer, C., 309 Scobey, F. C., 750 Scott, G. N., 1084 Searfauss, H. M., 616 Secchi, I., see Bozza, G. SECRIFAUSS, 11. M., 010
SECCHI, I., see BOZZA, G.
SEGRE, S., 758
SERKES, M., 472
SERKIN, E. S., see SIPYAGIN, A. S.
SETTLE, F. J., 1464
SETTLE, F. J., 788
SHANK, J. J., 618 SHANK, J. J., 618 SHATTUCK, G. C., 162 SHAW, A. M., and WADDELL, J. A. L., 1468 SHEPHERD, E. M., 582
SHERMAN, C. E., and WEED, J. M., 472
SHERMAN, C. W., 447, 1080
SHULITS, S., 769
SIEMS, V. B., 1466
SIERP, F., 1255
SIMMS, R. B., and MARQUIS, J. K. SIMMS, R. B., and MARQUIS, J. K., 1809 SIMPSON, H. E., 163 SINGER, E., 1489 SINTON, J. A., and KEHAR, N. D., 908 SIPYAGIN, A. S., and SERKIN, E. S., 911 SISLEY, P., and DAVID, 1803 SKILLINGS, B. H., 776 SLETTENMARK, G., 605 SMALSHAF, A. J., 321 SMITH, B. B., 155, 1096 SMITH, C. A., 608 SMITH, G. E. P., 1614 **SMITH**, H. B., 946 SMITH, H. B., 946
SMITH, H. V., see SMITH, M. C.
SMITH, M. C., 784, 1486
SMITH, M. C., LANTZ, E. M., and
SMITH, H. V., 474
SMITH, O. M., 964
SMITH, S. H., see HALL, R. B.
SMITH, W. E., 774
SNIDOW, H. W., see MESSER, R.
SOLARI, A. A. see SAGASTUME, C. A. Solari, A. A., see Sagastume, C. A. SOLDAN, W., 1491 SÖLLNER, K., see FREUNDLICH, H.

Г.,

H.,

254

D.

1.,

N,

Sorensen, P., 586 Southcott, R. J., see Knowles, C. R. see Bardwell, R. C. SPANGLER, M. G., 583
SPAULDING, C. H., 755, 773, 2043
SPELLER, F. N., see KENDALL, V.
SPITTA, O., see OHLMÜLLER, W. SPLITTGERBER, A., 1106, 1258 SPRECKELSEN, O., see PIATTI, L. SPRING, L. W., and MAACK, H. W., 749 Springborn, A., and Gottschalk, A., 913 A., 915
Springer, J. F., 1096
Stanley, W. E., 771
Stas, M. E., 922
Stearns, E. A., 609
Steffens, W., 1257, 1622
Steiner, O., 907
Sterling, C. I., Jr., and Belknap, J. B., 1101 J. B., 1101 STEVENS, S., see BEAL, R. B. STEWART, F. D., see WARING, F. H. STIMMEL, R. M., et al., 2046 STIMMEL, R. M., et al., 2046
STODDART, J. H., see ELLIS, D.
STOLL, K. E., see BORUFF, C. S.
STOUT, T. A., 465
STOUT, W., 473
STRATTON, R. C., FICKLEY, J. B., and
HOUGH, W. A., 2041
STRAUB, F. G., 1473
STRAUB, J., 313
see BODNAR, J. STRAUB, J., 313
see BODNAR, J.
STREETER, H. W., 450, 1094
STRICKLAND, G. H., 1238
STRINGER, G. F., 304
STRINGER, H., 1477
STROHM, T. W., see LUACES, E. L.
STRUBEN, A. M. A., 1249
STUART, F. E., 1808
STUART, F. E., 1808 STUART, J. M., and WORMWELL, F., 914 STUDENSKI, P., et al., 1492 STUMPER, R., 619, 905, 1466, 1469, 1490 SUCKLING, E. V., 1102 SUDA, H., and SALVATERRA, H., 1490 SUPINO, G., 1489 SÜRING, R., 1615 SZELINSKI, B., 1805 TAIT, R. S., 776 TAKEMATA, I., 294
TALLYN, L. L., see Knowles, C. R. TALLYN, L. L., and Holmes, R. L., 316 TAMMANN, G., 1235 TAYLOR, A., 786 TAYLOR, F. S., 957 TAYLOR, G. R., 616

TAYLOR, H. W., 944
TAYLOR, P. I., 296
TAYLOR, S. H., 949
TAYLOR, T. U., 1081 TAYLOR, T. U., 1081 TAYLOR, W. A., and McCrumb, F. R., 474 TEBENIKHIN, E. F., 1088 TEILMAN, I. H., see CHRISTIANSEN, J. E. TERREY. W. J., 161 TESCHNER, G., 159 TESCHNER, G., TEWES, K., 1621 THERIAULT, E. J., see WRIGHT, C. T. THERIAULT, E. J., and McNamee, THERIAULT, E. P. D., 2039 Thiem, G., 1105 Thieme, R. B., 1093 Thiriar, E., 1801 Thompson, D. G., 321, 1616 Thompson, F. C., and Atkin, W. R., 603 THOMPSON, H., see BARTOW, E. THOMPSON, T. G., and VAN CLEVE, R., 1800 THOMPSON, T. G., MILLER, R. C., HITCHINS, G. H., and TODD, S. P., 753 THOMPSON, T. G., and WRIGHT, C. C., 914 THRESH, J. C., and BEALE, J. F., 952, 1489 THUMA, R. A., 2042
TILLMANS, J., 1104
TILLMANS, J., HIRSCH, P., and HECK-MANN, W. R., 166, 1619
TILLMANS, J., HIRSCH, P., and LÜRMAN, H., 1256 TILLMANS, J., and NEU, E., 1256
TISDALE, E. S., 465, 771, 783
TODD, S. P., see THOMPSON, T. G.
TONNEY, F. O., GREER, F. E., and
LEIBIG, G. F., 928
TRAVERS, J. T., LEWIS, C. H., and
URBAIN, O. M., 917
TRAX. E. C., 616 TRAX, E. C., 616
TRELLES, R. A., see BADO, A. A.
TRIMBLE, H. M., 961
TRIPP, J. G., 1082
TRISTRAM, T. H., 956
TROTMAN, S. R., 159
TROWBRIDGE, C. E., 466, 956, 1492 TSURU, K., and MATSUSHITA, S., 1613 TUCKER, J. C., 1496 TURNER, H. G., see FARREL, M. A. Turner, T. H., 1091 Turowska, I., 1622 Tyler, D. M., 465, 765

UGLOW, W. A., 154 UGLOW, W. A., MILLER, A. A., and KAR-KADINOWSKY, 1479 Uglow, W. A., and Petrenko, I. G., 916 Uitti, G. I., 448 Underhill, F. T., 442 Underwood, G., 618 Urbain, O. M., see Travers, J. T. Uspenskaya, V. I., 906

Vagedes, K., 1479
Van, neglected for indexing purposes
Vardon, J., 1614
Vassilopoulos, J., 597
Veatch, F. M., 472, 1487
Veatch, N. T., Jr., 1244
Vernadsky, W., 1237
Vernon, W. H. J., and Jordan, L. A., 1474
Versluis, J. J., 459
Versluys, J., 1803
Viesohn, 1104
Villa, A., 910, 1802
Vogel, O., see Bauer, O.
Vollmar, 1806
Von, neglected for indexing purposes
Van Voorhees, F. M., and Huttenloch, G. M., 155

MANAMANAMANA

NNNNNNNNNN

LOCH, G. M., 155

WADDELL, C. E., 743
WADDELL, J. A. L., see SHAW, A. M. WADSWORTH, A. B., 1490
WAGENKNECHT, W., 1804
WAGNER, A., see MESSER, R.
WAGNER, H., 1091
WAHL, 1087
WALKER, H., 618
WALKER, J. H., and COLLINS, L. F., 1083
WALKER, L. R., 145
WALKER, S., 1092
WALLACE, C. F., 908
WANDENBULKE, F., see DIÉNERT, F.
WARD, H. B., 2043
WARING, F. H., 457, 472, 781
WARING, F. H., 457, 472, 781
WARING, F. H., and STEWART, F. D., 458, 472
WARING, W. H., 1497
WARREN, L., 1240
WATANABE, N., 920
WAUGH, E. H., 761, 921
WEED, J. M., see SHERMAN, C. E.
WEHRLE, G., 1085
WEIBE, A. H., 922
WEIGLE, O. M., see BARTOW, E.
WELLAND, A. A., 610
WEIR, P. L., 322, 1808
WEITKAMP, H. E., 1622
WELCH, H., and PERKINS, R. G., 1098
WENTWORTH, J. P., 1483
WESLEY, J. B., see BARDWELL, R. C.
WEST, F. D., 608, 930

WESTERGAARD, H. M., 746

Weston, A. D., 780
Weston, R. S., 448, 453
Whipple, M. C., see Fair, G. M.
White, A. H., Parker, J. H., Partridge, E. P., Collins, L. F., 1107
White, B. E., 582
White, W. N., 760, 1495
Whitener, J. S., 926, 1493
Whitman, E. B., 447
Whitney, M. L., 1495
Whysall, C. C., 956, 959
Whyte, W. E., 313, 1097
Wiebe, A. H., 916
Wilbanks, J. R., 297
Willey, A. J., 1082
Willox, R. L., and Milligan, E., 1479
Williams, H. O., 155, 772, 2044
Williams, H. O., 155, 772, 2044
Williams, W., 297
Wills, W. C., 468
Wilson, W. J., 938
Wilson, W. J., 398
Wilson, W. J., and Blair, E. M. 785
Winfrey, R., and Kurtz, E. B., 620
Withrow, J. R., see Zinzalian, G.
Wolfe, E. E., 601, 1100
Wolff, H., 912
Wolfsperger, E., and Johnson, R.
N., 1261

G.,

T.

oses

A.,

OSES

M.

F.,

F.

D.,

098 C. Wolman, A., 1103, 1242
Wolman, A., and Gorman, A. E., 1482
Wood, D. R., and Illing, E. T., 312
Wood, T. W., 592
Woodley, J. W. A., see Butcher, R. W.
Woodruff, J. L., 468
Woods, A., 1497
Workman, L. E., 459, 775
Wormwell, F., see Stuart, J. M.
Worsham, J. A., 588
v. Wrangel, M., 910
Wright, C. C., see Thompson, T. G.
Wright, C. T., and Theriault, E. J., 165
Wright, H., 291
Wright, W. H., see Robertson, A. G.
Wyckoff, H. A., 321
Wynne-Roberts, R. O., 448, 755

YANT, W. P., see LEITCH, R. D. YARNELL, D. L., 593 YEO, H. W., 460 YOUNGBURG, G. E., see FARBER, J. E.

Zapadinskii, M. B., 916 Zeh, H., 1106 Ziegler, K., and Dorle, M., 754 Zinzalian, G., and Withrow, J. R., 2040

INDEX TO ABSTRACTS

II. Subjects

Abattoir; see Packing house Abilene, Tex.; emergency water sup-ply, 600 Accounting; 1809

distribution system maintenance and depreciation and, 146.

Acidity; correction; aeration and,

graphs as aid to, 917 lime treatment and, 465, 1257, 1805

marble filtration and, 1805 drought and, 465

mine waste and, 467, 1466 see Carbon dioxide; H-ion concen-

tration; Industrial wastes; Lead; Pipe corrosion; Soil

Ackerfähre, Ger.; ground water, facil-

ities for increasing, 766 Actinomyces; earthy tastes and, 940 carbon; Activated see Carbon, activated

Ada, Okla.; water and sewerage systems, 964

Administration; 321, 1248

Admiralty metal; see Pipe, admiralty

Aeration; 464, 611, 618, 770, 782, 784, 921, 926, 1096, 1487, 1804 Aer-O-Mix and, 964, 1485, 1494 coke tricklers and, 448, 607, 930

diffused, 963 spray nozzles; 615, 786, 942, 1806

Sacramento type, 596
see Acidity; Air; Carbon dioxide;
Chlorination, taste and odor;
Corrosiveness; Hydrogen-ion concentration; Hydrogen sulfide;
Iron removal: Manganganger; Iron removal; Manganese removal; Microscopic organisms; Oxygen dissolved; Pollution, stream; Sewage treatment; Swimming pool; Taste and odor

Aggressivity; see Corrosiveness Agitation; see Coagulation; Mixing Aikawa, S. Manchuria; ground water, 1614

Air; supersaturation with; factors, 450

spraying and, 450 see Aeration; Filtration, rapid sand; Oxygen dissolved

Alu Alu 93 Alu Alu

> ce de

> > re

86

Alu d

Alu Am

p

Am

Am

86

C

1

tı

W

ir

fı

ti

t

W

b

W

c

Anı

And

Apl 7

Aqı

Aqu

g

n

n

8

8

Arc

Arg

8

Am

Am

And

Am

Am

Air-lift; see Well, pumping Akron, O.; filter shrinkage cracks, algae tastes and, 953

Alabama Power Co.; Jordan Dam, cofferdam construction and closure

procedure, 1240 Albama Water Service Co.; corrosiveness, aeration and "Purite" treat-

ment and, 929 Albany, N. Y.; prefiltration, 456 Alberta, Can.; hydrometric investigations, 951

irrigation practice, 951

Albuquerque, N. M.; new swimming pool, 776 Alcoa Power Co.; Chûte-à-Caron

diversion dam construction, 741 Alexander Dam; see McBryde Sugar

Co.

Algae; see Microscopic organisms Alkali metals; determination, titrimetric, 1256

see Potassium; Sodium Alkalinity; concrete-lined pipe and, 1476

determination; 1236 boiler water and, nomogram and, 1086

Calcium carbonate; Carbon seedioxide

Altona; slow sand filtration, pre-filters and, 767 water supply, 767

solution specific Alum; analysis, gravity and, 909 basic, 908

manufacture, 909

solutions, concentration, specific gravity and, 909

water of crystallization, 908 see Aluminum; Coagulation; Color; Iron removal; Manganese removal Alumet; coatings, 912 Alumina determination; "residual,"

930 Alumino-ferric; see Coagulation;

Swimming pool
Aluminum; bacteria and, 1235
corrosion, protection, chromates
and, 1254

determination; dehydration of alumina and aluminum phosphate precipitates, 1083 as oxide, 914

removal, 1238 see Softening

ors,

nd;

ks,

m.

ure

at-

ti-

ng

on

ri-

d,

d,

n

1-

ic

c

Aluminum Company of America; Calderwood Dam; construction, 742
gate handling equipment, 1239
overflow scour and, 293

Aluminum sulfate; see Alum American Engineering Council; oil pollution committee; 588

report, 1616 American Water Works Association; see Southeastern Section

American Water Works and Electric Co.; distribution system practice, 145

pipe, cement-lined, 146 taste and odor, activated carbon

and, 956 water unaccounted for, 145

Amesbury, Mass.; carbon dioxide and iron removal plant, 448

Ammonia, see Chlorination; Chlorine, free, determination; Dechlorination; Taste and odor

Ammonia, albuminoid, determination; in sea water, 1802 Ammonia, free, determination; in sea

Ammonia, free, determination; in sea water, 1802 Anderson, Ind.: taste, activated car-

Anderson, Ind.; taste, activated carbon and, 782
water supply investigation, 784
Annapolis, Md.; manganese removal.

Annapolis, Md.; manganese removal, chlorinated copperas and, 1103 Anopholes; see Mosquito

Aphanizomenon; copper sulfate and, 770

Aquaphone; 949
Aqueduct; ancient, 774
growths, chlorination and, 611
manganese deposit, 453

new, 296, 610 sterilization with chlorine, 948 see Conduit; Pipe

Arcanol; see Paint Argentine Republic; waters; iodine and, 1087 soda-lime magnesia ratio, 1087 Arizona; rainfall and evaporation, 1614

Army; filters, pressure, mobile, 919 Lyster bag; calcium hypochlorite and; 919

dechlorination with thiosulfate, 919

iodine and, 919 water carts, 919

water supplies, sterilization, sodium peroxide and, 916

Arsenic; copper pipe and, 935 determination, 907, 1800 poisoning; water in contact with paint and, 786 well supply and, 307 springs and, 1616

in water, fixation in tadpoles, 1800 well water and, 1800

Artlenburg; Elbe water, chlorine and oxygen demand and, 757 Asbury Park, N. J.; ground water,

1616 Asheville; Bee Tree Dam, core sam-

pling and testing, 743
Asphalt; see Pipe coating
Aswan Dam; raising of, 296
Athens, Greece; Boyati tunnel, 590
water supply, 597

Atlanta, Ga.; turbidimeters, 1808 water treatment, 322

Atlantic City, N. J.; rates, 950 water works, 949

Aussig; superchlorination and activated carbon dechlorination, 309, 312

Bacillus, leather; tap washers and, 1619

Back River; Baltimore sewage plant, algae and, 1104

Bacteria; 1095
-activating power of filtered water,
906

aftergrowths; algae, organic matter, etc., and, 318, 926 prevalence, 928

reservoirs, open, and, 318, 787, 928

chlorine deathpoint, determining, 928

enumeration, direct count, 603 food supply and, 451 plankton and, 451 raw water standards, 452 softening, base exchange, and, 935 sunlight and, 451, 604 turbidity and, correlation, 604 in water; classification, 926

significance, 469, 926 see Bacterium coli; Chlorination; Disinfection; Filtration; Purifi-cation; Sterilization; Storage;

Bacteria, colon group; differentia-tion; 954, 1482

coli-aerogenes, lacmoid-glucosepeptone-gelatin, 767 fecal and non-fecal, Dominick-

Lauter medium, 1479

indol, methyl red, Voges-Proskauer and citrate tests, 2040 methods, reliability, 1480

warm- and cold-blooded animal origin and, 1480

in water analysis; desirability, 1471 preliminary enrichment vs.

direct plating and, 2040 see Bacterium aerogenes; Bacterium coli

Bacteria, iron; H-ion concentration and, 166, 1622 iron content and, 1622 lime treatment and, 166 pipeline incrustation and, 166 salts and, 1622

temperature and, 1622
see Crenothrix; Gallionella; Leptothrix; Pipe; Pipe, corrosion; etc.
Bacteria, lactose-fermenting; disap-

pearance, rate of, significance, 604 isolation methods, 604

see Bacteria, colon group; Bacterium aerogenes; Bacterium coli

Bacteria, manganese; 453 see Manganese removal

Bacteria, spore-forming; chlorine and;

ammonia and, 320

Bacteria, sulfate-reducing; life of, 768 in oil well waters, 746

Bacteria, sulfite-reducing; enumeration, 938

significance in water, 938

Bacteriological examination; 771 regular, value of, 2037

see Bacteria; Bacteria, colon group; lactose-fermenting; Bacteria, Bacterium coli test; Bacterium Bacterium welchii; typhosum; Books; Pollution; Streptococci; Swimming pool; Vibrio cholerae

Bacteriology; see Books Bacteriophage; 1619

of sewage, chlorination and, 754 Bacterium aerogenes; -B. coli ratio in feces and soil, 153

chlorine death point, 1258 soils, habitated, and, 1471 in water, significance, 154, 1496 see Bacteria, colon group; Bacteria, lactose-fermenting; Bacterium coli

Bacterium coli; -activating power of filtered water, 906 bacteriophage and, 1480

-B. aerogenes ratio in feces and soil, 153

Berkefeld candle and, 769 per capita contribution, 450 chlorine and; ammonia and, 1471 deathpoint, 1258

tolerance, 917 copper and; 1235 adaptation to, 754 disinfection studies, 464

distribution system, increase in; microörganisms and, 926

reservoirs, open, and, 318, 928 yes, phosphorescent light and, 1479 dyes,

glucose fermentation, acidity and pH and; 913 inhibition and, 913 gulls and, 948, 1251, 1619

B

B

B

B

B

identification, 1479, 1481 indol formation, 1480 jute packing and, 773

Katadyn and, 305, 310, 474, 769, leather and, 2038

"leather bacillus," tap washers and, 1619

-like organisms in feces and soil, 1471 lime, excess, and, 473

microörganisms and, 318 multiplication, 450 origin, 1480 pigeons, access to tank and, 2038 significance, 470, 1475, 1480 silver and, 754, 1235, 1479 soil, virgin, and, 1480

standard of quality and, 758 storage and, 473 ultra-violet radiation and, eosin and

fluorescein and, 1098 see Bacteria, colon group; Bacteria, lactose-fermenting; Bacterium lactose-fermenting;

aerogenes; Purification; Sterilization; Swimming pool; etc. Bacterium coli test; 600

bile and, 921 confirmation; brilliant green bile and, 763 eosin-methylene blue agar, mixed cultures and, 2040

medium for, 785 direct plating and; 1482, 2040 lacmoid-glucose-phosphate-peptone-gelatin and, 767 incubation at 37 and 45°, 921 lactose-indol index and, 1482 most probable number formulas, Parietti method, 759 presumptive; gas, less than 10%, significance, 581 lactose broth and; confirmation, water quality and, 1473 Dominick-Lauter medium and, comparison, 1473, 1479 lactose bile and, comparison; 581 brilliant green bile and, comparison, 954 Dominick-Lauter medium and, comparison, 955 mixed cultures and, 2040 medium for, 785 positives, spurious; caustic water and, 955 chlorinated water and, 955 fuchsin broth and, 955 Bacterium manganicus; see Manganese removal Bacterium paratyphosum; B, isolation, glucose-bismuth-sulfite-iron medium, 785 isolation from sewage, 931 in sewage, 1618 Bacterium subtilis; chlorine deathpoint, 928, 1258 Bacterium typhosum; copper, adaptation to, 754 gulls and, 949 isolation; glucose-bismuth-sulfiteiron medium, 473, 785, 939 from sewage, 931 longevity in water; 785, 920, 1618 Bodo saltans and, 785 cultivated and uncultivated, 1618 protozoa and, 1806 temperature and, 1618 in sewage; 786, 931 purification and, 939 silver and, 754 in water, 939 Bacterium welchii; enumeration, sulfite-glucose-iron medium, 938 significance in water, 938 Balaton Lake; epiphytic investigations, 606 Baltimore, Md.; ammonia-chlorine

cte-

cte-

r of

oil,

in;

nd,

and

69,

ers

oil,

nd

m

i-

le

treatment, 468

filter sand experiments, 771

mains, new, sterilization, 1616 manganese removal, 453, 1103 Prettyboy Dam, 742 sewage, chlcrine-copper and limechlorine treatment and, 1104 water, iodine and, goiter and, 2037 Bangor; water supply and purification, 1482 Bankok, Siam; sewerage and, 1464 water; purification, cholera and, 596 supply, 596, 942, 1464
Barberton, O.; purification plant, 464
reservoir, pine tree planting and, 955 Barium aluminate; manufacture, 905 see Boiler feed water treatment; Softening Barium carbonate; see Boiler scale Barium chloride; see Coagulation Barium fluoride; see Softening Barium treatment; see Boiler feed water treatment; Softening Barnesville, Ga.; sewage discharge, court decision re, 1096 Barrage; Nag Hamadi, construction, Base exchange; see Softening; Zeolite Bat; killing with chlorine, 616 Bath, public; 761, 2036, 2037 Bathing; see Swimming pool; Watershed Bathing beach; by-laws, model, 1483 protection, 1089 sewage treatment and, 792, 1483 survey, 762 water quality, factors, 1095 see Swimming pool Bay City, Mich.; taste, activated carbon filters and, 1252 Bedford, Eng.; percolating filters, 1261 Bee Tree Dam; see Asheville Beggiatoa; 786 in slow sand filter effluent, 789 Belfast, Ireland; reservoirs; gulls, wiring and, 1251 Silent Valley, 457 sewage, B. typhosum and, 786 Berkefeld filter; see Filter Berkeley, Cal.; consumption, 754 see East Bay Municipal Utility District Berlin, Ger.; consumption, 1255 Beulah Beach; chlorination, HTH, and cost, 312 consumption, 312
Beverly Hills, Cal; consumption, 786 purification plant, 786 Bibliography; see Books

Big Bethel, Va.; prechlorination, 782 Billing; delinquents, service discontinuation, legality, 1100 frequency, practice, 153, 779 overcharge, liability and, 1100 practice, 152 Biochemical oxygen demand; see Oxygen demand Biology; see Books, new Birmingham, Eng.; Bartley reservoir, leakage, 166 Hams Hall electric station, feed water treatment, 936 Bismuth; determination, 907 Blacksburg, Va.; sewage plant, report, 788 Blacksville, Va.; water supply, 927 Bleaching; water difficulties, 1468 Bleaching powder; disinfecting power, see Chloride of lime; Chlorination; Iron removal Bloomington, Ill.; consumption, 588 softening; excess lime and recarbonation, 588 and purification plant, financing, 1486 Bloomington, Ind.; consumption, metering and, 748 reservoir, new, 783 Bodo saltans; number variations, 785 self-purification and, 785 Boiler; control instruments, 1470 seams, leaky, regular inspection and, 1473 superheater; design, 1237 pipes, "Alumet" coating, 912 tubes, corrosion, temperature and, 1236 tubes, "Alumet" coating, 912 see Books; Railroad Boiler compound; organic matter and, 1107 see Boiler water Boiler corrosion; causes, 464, 1496 colloids and, 1466 embrittlement; 1106 bibliography, 1106 prevention; acetates, chromates nitrates and tannates, 614, 1474 colloids and, 1478 phosphate and, 160, 614, 940, 1259, 1474 sodium sulfate and; 614, 1474, 1496 -carbonate ratio and, 160, 940

soda ash treatment of water low

in sulfate and, 1473

sodium hydroxide; concentration and; 940 in rivet seams and, 160. 940, 1474 stress and, 1473 theory, 1496 loss through in United States, 464 oxygen and, 160, 1091 phosphate and, 1258, 1259 pitting, cause, 1496 prevention; 160, 464, 917 alkali and, dosage, calculation, 160 alkalinity adjustment and, 1496 deactivation and, 311 deaeration and; 1467 and pH adjustment, 1468 oxygen removal and, 1473 phosphate and, 1467 silica and, 303 theory, 311 see Railroad Boiler feed water; chloride determination, conductivity and, 1801 flow, control by steam flow, 1253 heater, 160 impurities, troubles and, 1091 incrustants, fuel loss, etc., and, Boiler feed water treatment; 473, 905, 935, 1496 barium aluminate and, 905 carbon dioxide removal, deaerating heater and, 1108 deaeration, 160, 311 degasification, 905 dosage diagram, 2041 evaporator and, 311 H-ion concentration and, 311 lime; -barium, 311 -soda; 311, 1259 -zeolite, 160, 936 oxygen removal, hydrogen-containing gas and, 302 phosphate and; 917, 1258, 1259 alkalinity and, 1259 concentration required, 1467 cost, 1259, 1467 phosphoric acid and, 1259 potassium hydroxide and, 311 reagent for, 310 silicate removal; 1467 sodium aluminate and, 1089 soda ash and, 311 sodium hydroxide and, 311, 1083 softening; 1107 theory, 905 zeolite, 311

Bo

I

Bo

Bo

1

Bo

(

I

Bo

see Boiler corrosion; Boiler foaming; Boiler priming; Boiler scale; Books; Railroad Boiler foaming; 464, 1106 colloids and, 1466 mine waste and, 2042 prevention; 160 blow-down and, 1496 castor oil and, 917 phosphate and, 1258, 1467 sodium aluminate and, 614 solids and, 755, 2041 stabilizing, oil and, 2041 steam volume and, 755 theory, 1496 see Boiler priming; Railroad Boiler furnace; flue gas analysis apparatus, 1470 flues, "Alumet" coating, 912 fuel, pulverized, and, 936 gas, natural, and, 942 Boiler priming; 464 mine waste and, 2042 oil and, 907 organic matter and; 907 removal with charcoal and, 907

tion

160,

on,

6

na

nd,

05,

at-

n-

organic matter and; 907
removal with charcoal and, 90
prevention; 160
blow-down and, 907
castor oil and, 907
colloids and, 1478
phosphate and, 1258
salts and, 461
suspended matter and, 907, 2041
theory, 1496
see Boiler foaming; Boiler water

see Boiler foaming; Boiler water Boiler scale; analyses, 909 causes, 464, 1496 prevention; 464, 917

colloids and, 305, 940, 1466, 1478 Filtrator and, 1235 lime; and barium carbonate, 917

-soda; 940 sodium aluminate and,

940 phosphate and, 160, 917, 940, 1258, 1259, 1467

silicate; colloids and, 1466 sodium carbonate and, 303 sodium hydroxide and, 1083 soda and, 160, 940, 1467 zeolite-sulfuric-phosphoric acid,

1083, 1107 removal, phosphate and, 1258, 1259, 1467

silica and, 303, 909 thermal conductivity, 909 tube damage and, 909 see Books; Railroad

Boiler water; alkalinity determination, nomogram and, 1086 analysis and interpretation, 2046 blow-down, continuous; 311, 1107 heat recovery and, 160

oil and, 1107

organic matter and, 1107
phosphate content, permissible,

salt content, permissible, 1107 soda number, slide rule and, 766 sodium hydroxide content, permissible, 1107

solids, dissolved, determination, hydrometer and, 2048

steam bubbles, size, etc.; organic matter and, 907 salt concentration and, 462, 907

treatment; compounds and, 311 sodium aluminate and, 614 see Boiler corrosion; Boiler foaming; Railroad; etc.

Boise, Idaho; hot water system, 778 Boise River Valley; irrigation, wells and, 144

Bombay, India; water supply, 591 Bond: see Financing

Books, new; A Practical Handbook of Water Supply, 1491

A Simple Method of Water Analysis with Sections on the Analysis of Sewage Effluents and on the Purification of Water by Means of Chlorine, 952, 1489

An Investigation of the River Lark and the Effect of Beet Sugar Pollution, 322

Angewandte Hydromechanik, 1491 Appraisers' and Assessors' Manual, 619

Archiv zur Klärung der Wünschelrutenfrage: Organ des Verbandes zur Klärung der Wünschelrutenfrage E. V., 620

Bibliography of Bibliographies on Chemistry and Chemical Technology, 793

Biological Chemistry and Physics of Sea Water, 616

British Waterworks Yearbook, 1930 -31, 952

Colorado River and the Boulder Canyon Project: Historical and Physical Facts in Connection with the Colorado River and Lower Basin Development, 1492

Das Wasser in der Natur und im Dienste des Menschen, 1489 Der Ruhrverband, 619

Die Bakteriologische Untersuchung des Trinkwassers, 1489 Die physikalische Chemie der Kesselsteinbildung und ihrer Verhütung, 619

Electric Arc Welding, 1489

Engineering, 618

Essai d'Hydrogeologie, 619 Estimating Construction Costs, 618

Examination of Water, 788

Federal Limitations upon Municipal 618 Ordinance-Making Power,

Guide théorique et practique de la verdunisation, 1490

Handbuch der Wünschelrute: Geschichte. Wissenschaft, Anwendung, 620

Heat Loss Analysis. The Key to Economic Boiler Operation, 619

Hydraulies for Engineers, 322 Hydrogen Ions: Their Determination and Importance in Pure and Industrial Chemistry, 170 Il Riscaldamento Dell'Acqua Nelle

Condotte, 1489 Iodine Supply and the Incidence of Endemic Goiter, 1490

Laboratoriumsbuch für die Kolorimetrische Wasseruntersuchung, 1489

Land Drainage and Flood Protection, 1492

L'Eau que l'on boit à Paris, 1489 Les eaux d'Egypte, 322

Life Characteristics of Physical Property, 620

Life Expectancy of Physical Property: Based on Mortality Laws,

Manual of Dehydrated Culture Me-

dia and Reagents, 1489 Modern Diesel Engine Practice: A Comprehensive Treatise for the Student and Practical Engineer, 1492

National Aspects of Water Power Development: A Review of the Facts, 1492

Ohio Public Utility Rate Book. I. Water Rates and Service, 1261 On the Stresses in Arch Dams, 1491 Oxy-Acetylene Welding and Cut-

ting, 1490 Oxy-Acetylene Welding and Cut-ting, A Course of Instruction, 619 Oxy-Acetylene Welding Practice,

1490 Rainfall and Stream Runoff in Southern California Since 1769,

Regulation of Public Utilities, 1491

Reinforced-Concrete Reservoirs and Tanks, 1491

Rostschutz und Rostschutzanstrich Bauingenieure und Baufür fachleute Physiker und Chemiker, 1490

Bi

Bi

Bi

B

B

B

B

B

B

B

B

B

B

B

B

Speisewasser und Speisewasseroflege im neuzeitlichen Dampfkraftbetrieb, 1490

Standard Manual on Pipe Welding, 1490

Standard Methods of the Division of Laboratories and Research of the New York State Department of Health, 1490

Talsperren, 1491 Technical Writing, 1491 The Analysis of Fuel, Gas, Water and Lubricants, 1490

The Chemistry and Bacteriology of Public Health, 619

The Corrosion of Metals, 619

The Design of Dams, 1491
The Government of Metropolitan Areas in the United States, 1492 The Measurement of Hydrogen-Ion

Concentration, 619 The Modern Dowser: A Guide to

the Use of the Diving Rod and Pendulum, 620 The Waters of Egypt, 170

The Welding Industry, 619 Geschwindigkeitsformeln, Uber 1491

Untersuchung des Wassers an Ort und Stelle, 1490

Untersuchung und Beurteilung des Wassers und des Abwassers. Ein Handbuch für die Praxis und zum Gebr. im Laboratorium, 1489 Water Purification Control, 1622

Water Supply Control, 320 Borehole; see Well

Boron; determination, 1091, 2041 Boston, Mass.; cast iron pipe; fail-ures, 949 old, 765

rainfall data, 1080

service interruptions, 949 Wachusett-Coldbrook tunnel construction, 583

Ware River supply system, 766
Ware and Swift River diversions,
suit re, 454, 752, 931

water supply extensions, 752 Boulder City, Nev.; water works, 775,

1465Boulder Dam; see Books; United States Bureau of Reclamation Boxtel; water supply, 2036

Bradford, Eng.; new reservoir, 1102 Brandy Wine Creek; pollution survey Brantford, Ont.; filter plant, new,

1240

oirs

rich

Bau-

mi-

ser-

npf-

ing,

sion

of

ent

ter

ogy

tan

Ion

and

ln,

Ort

les

rs.

nd

il-

n-

18,

5,

2

Brass; corrosion, protection, chromates and, 1254 see Condenser; Pipe, brass

Breslau, Ger.; iron and manganese, flood and, 453 raw water measuring equipment,

769 water purification, 1804 water works, 769

Brewing; water and; 912 carbonate removal, 311 hardness and, 303

Bridge River Project; see British Columbia Electric Railway Co. Brilliant green; see Bacterium coli

Brine; solids, determination, 2040

Brisbane, Australia; consumption, water supply extensions, 2038

British Columbia; hydrometric investigations, 951

British Columbia Electric Railway Co.; Bridge River tunnel; construc-

geophysical exploration and, 580 Bromine; chlorination, liberation by,

determination, in sea water, 759 sterilization and, 312

taste and, 312 Brownsville; new filter plant, 1096 Bryozoa; see Conduit

Bucyrus, O.; pipe gallery hangers, 953 Buenos Aires; subway construction, 1465 water, iodine and, 913

Cairo, Egypt; water supply and sewage disposal, 608

Calcium; see Mineral content

Calcium aluminate; solubility, hydrolysis and, 914

carbonate; deposition; in mains, lime-soda softening and, 156 as protective coating; 167, 469, 758, 1104

carbon dioxide adsorption by ferric hydroxide and, 1801 crystalline vs. amorphous, 1478

lime treatment and; 758, 945, 1104, 1620 pH control, 929

marble filtration and, 1805

oxygen dissolved and, 1800 salts and, 1619, 1620 temperature and, 1619

saturation, corrosiveness and, 1103 see Carbon dioxide; Carbon dioxide removal; Carbonation; Hardness; Softening

Calcium determination; as oxalate; gravimetric, 914 volumetric, 922, 1260

see Hardness

Calcium hydroxide; see Lead Calcium hypochlorite; HTH, composition, 1801

see Army; Bleaching powder; Cap-orite; Chlorination; Hypochloorite; Chlorination; rite; Main; Reservoir

Calcutta; Tallah tank, 591

water supply contamination, 591
Calderwood Dam; see Aluminum
Company of America Calgary Power Co.; new power plant,

California; evaporation formula, 1081 Southern; consumption, 786 rainfall and runoff, 777, 1613 sewage reclamation, 588 water, soils, etc., radioactivity,

1620 swimming pool cross-connections, regulations re, 593 water supplies, bacteriological ex-

amination, 1085

see Books Calumet City; sewage treatment plans, 1265

Calumet River, Little; pollution, 784 Cambridge, Mass.; pumping engine, new, 157

Cameron, Mo.; water purification, 1096

water works and power plant, 155 Canada; electric stations, directory of, 950

hydraulic installations, 950 typhoid and dysentery epidemics, water-borne, 1920-9, 1482

water power; development, 951 resources, 950

water supply systems, directory of, 1239

Canadian Pacific Railway; Quebec City tunnel, construction, 1241 Canal; construction, 301 lining, capacity increase and, 587

see Channel; Flow

Canberra, Australia; water supply,

Cape Town, S. A.; well casing, shooting holes in, 298

Caporite; disinfecting power, 162 Carbon, activated; activation, 466 adsorption; capacity, active sur-face and, 1236

of organic and inorganic compounds, 1252

surface tension of solution and, 1252

temperature and, 1468 cresol, freeing of, 1086

feed apparatus; 609, 788, 1493 dry, 782, 1252, 1492, 1493 filters; 292, 2046

household, 1256 iron, nitrate, nitrite and organic matter and, 768

"Mutonator" and, 1255, 1806 regeneration, alkaline hypochlorite and, 1255

pH alteration and, 1493 preparation, 916, 1255 properties, 916, 1255, 1808 regeneration, 911, 1255 specifications, 1493 storage; 1468

Penicillium glaucum growths and,

spontaneous combustion and, 1468

surface area, 1493 testing, 1236, 1252, 1255, 1258 treatment, 466, 931

see Charcoal; Chlorination; Chlorination, taste and odor; Coagulation; Color; Dechlorination; Filtration, rapid sand; Gas and coke works; Industrial wastes; Iron removal; Norit; Odor; Organic matter; Phenol; Sedimentation basin; Softening; Swimming pool; Taste

Carbon dioxide; -carbonate equilibrium; determination, 166

equation, 167 salts, effect of, 167, 1619 of sea water, 753 temperature and, 166, 1619

free, half-bound and bound, pH and, relationship, 917

photosynthesis and, 753 see Calcium carbonate; Carbonation; Corrosiveness; Hot water system; Lead; Manganese; Microscopic organisms; Peridinia; Pipe corrosion; Softening

Carbon dioxide determination; aggressive, marble method, 934 free, 1619 in supersaturated waters, 602

titrimetric, 753

see Alkalinity; Carbonate Carbon dioxide removal; 466 aeration and, 448, 607, 930, 1104.

1256 Aer-O-Mix and, 964 calcium carbonate, filtration

through and, 1256 decarbonation and aeration and, 2041

lime and, 1096, 1104, 1256

magnesium carbonate, filtration through and, 1256 filtration magnesium oxide.

through and, 1256 marble, filtration through and; 1104 1105

hardness increase and, 1105

soda and, 1256 see Acidity; Boiler feed water treatment; Corrosiveness

Carbonate number; determination, 934

Carbonation; 163, 600, 618, 757, 944, 956, 957, 1618

Aer-O-Mix and, 964 coke-fired boiler and, 958, 1101 coke gas-producer and, 444

(

filter sand incrustation prevention and, 471 gas, natural and, 1487

oil burner and, 588 stack gas and; 1809 apparatus, 755 cost, 755

see Softening Carp; pH and, 1801

Carpet manufacture; water purification and, 1486

Castle Rock, Colo.; infiltration gallery, 610

Cedartown, Ga.; new standpipe, 156 Chamberland filter; see Filter Champaign and Urbana Water Co.;

reservoir, worm infestation, 958 Channel; silt-laden, flow measure-ment, Parshall measuring flume and, 750

Charcoal; see Carbon, activated; Dechlorination; Organic matter; Phenol

Charleston, W. Va.; taste and odor, treatments for, 944
Charlottesville, Va.; microörganisms, taste and odor and, 1465

Chelsea Waterworks Co.; slow sand filters, early, 586

Chemical; handling, 921

Chemical feed; 144, 317, 470, 939, 2046 solution; 1080 vs. dry, 1487

see Carbon, activated; Lime Chemistry; see Books Chemnitz; corrosiveness, 1804 Chicago, Ill.; activated carbon filters, experimental, 1252 B. coli per capita, 450 chlorination, date of adoption, 1266 emergency organization, 1464 fountain, Buckingham Memorial, 585 intake, 149 mains, new, sterilization, 760, 1616 pumping station, piping design, purification; experimental plant results, 292 tentative plans and cost, 291 rates, 292 tunnel, Chicago Ave., 459 typhoid; 791 control, history, 1266 water supply pollution, protection and, 1262 water works, financial condition, Chicago Sanitary District; area and population, 1264 diversion; 790, 792, 793, 1264 lake levels and; 1264 remedial works and, 793 water-borne disease decrease and, 791 Chickasha, Okla.; water supply, 961 China; sanitation and; 296 and water supplies, 1468 Chironomus; life habits, 958 reservoir infestation, covering and, Chloramine; applications, 909, 928 bactericidal power; 929 purity and, 1083 chemistry of, 909, 929 determination; in presence of nitrogen trichloride and hypochlorous acid, 1471 o-tolidin and, 321 formation, pH and, 321, 759 Heyden, chlorine content and disinfecting power, 168 mono-, conversion to di-, pH and, 1247 preparation, 928, 1247 properties, 321, 928 see Chlorination; Chlorine, free, determination; Dechlorination; Microscopic organisms; Sewage treatment; Taste and odor Chloramine-T; see Chlorination Chlorante; see Chlorination Chloride; content, taste and, 1246

1104,

tion

and,

tion

tion

1104

eat-

ion,

944,

ion

ca.

al-

156

0.;

re-

me

d

er;

18,

nd

16

determination; 1236 in boiler feed water, conductivity method, 1801 in sea water, Mohr's method, 1800 silver nitrate and, in field, 908 Chloride of lime; see Bleaching; Chlorante Chlorinated copperas; see Coagulation; Color; Iron removal; Manganese removal; Microscopic organ-Chlorination; 144, 322, 474, 908, 913, 935, 1088 aftergrowths and, 919 agitation and; 930 Bunau-Varilla system and, 1257 alkalinity and, 608 ammonia and; 473, 617, 787, 921, 930, 931, 1080 aftergrowths and, 163, 466, 964 apparatus, 163 bibliography, 1248 contact period and, 1494 contamination, subsequent, and, 466 cost, 163 dosage, 163, 618, 1098, 1494, 1618 efficiency and; 163, 320, 759, 1098, 1247, 1258 pH and, 963 history, 1247 products; dosage ratio and, 1471 pH and, 759, 1247 residual; persistence and, 320, 759 required, temperature and, 1247 sterilization rate and, 320, 1258, 1471, 1494 sterilizing effect, prolonged, and, 608, 1247 apparatus; 743, 908 automatic; 1257 cross-connected supplies and. boat, for reservoir, 778 for calcium hypochlorite, 594 duplicate, advisability, 1807 fire pump, 319 freezing, prevention, 616 portable, 767 ton containers and, 1486 application, point of, 595 bleaching powder and, 299 bromine liberation, efficiency and, Buneau-Varilla method, 307, 597 chloramine and, 459, 768 chloramine-T and, 299 Chlorante and, 302 copper and, 930, 1104

Main;

corrosion and, 1097, 1106 dosage; 473, 595, 597, 756, 1106, 1464 organic matter and, 302 required, determination, chlorine absorption diagrams (A.D.M.) and, 1255 double, 319, 1255 emergency supplies and, 1237 as emergency treatment only, 1105 in England, 165 extent employed, 457, 581, 782, 1807 vs. filtration and chlorination, 793 floc particles and, 609 history, 1617 humus and, 304 hydrogen-ion concentration; alteration and, 319, 1106 influence of, 759, 930, 1247 hydrogen sulfide and, 1260 hypochlorite; and activated carbon filtration, 1475 HTH and, and cost, 312 leptospira and, 1619 multiple, 319 pre-; 456, 464, 609, 921, 953, 1106, 1255, 1617, 1804 advantages and disadvantages, 319 powdered activated carbon application ahead of, 1808 protococcus and, 778, 779 residual and; 595, 609, 919, 928, 938, control; 920 automatic, 320 records and, 596 tests, frequency and, 596 "separable" chlorine and, 304 sewage and, 304 silver salts and, 1084 small supplies and; bleaching pow-der and, 162, 781 halazone tablets and, 162

spore-bearers and, 928

temperature and, 759 theory; 308, 930 radiation, 915 typhoid and, 320

Dechlorination;

super-; 935 and dechlorination, 319, 1255, 1806

Aqueduct; Army; Bacterio-

Disinfection;

phage; Bacterium aerogenes; Bac-

terium coli; Bacterium subtilis; Books; Caporite; Chloramine; Chlorine absorption; Coagula-tion; Color; Condenser; Conduit;

Filtration; Filtration, rapid sand;

Filtration, slow sand; Iron re-

of stream, 611

Phenol; Sewage; Swimming pool; Taste and odor; Vessel; Well Chlorination, taste and odor; aeration and, 163 ammonia and; 163, 320, 465, 617. 935, 948 ammonia loss and, 466 cost, 468 dosage and, 466, 468, 1618 bromine liberation and, 312 carbon, activated, and, 935 chlorinous, ammonia and, 466, 964, 1098, 1495 permanganate and, 935, 1617 phenol and; 451, 948 ammonia and; 321, 466, 1098, 1238 dosage and, 616, 954, 1090 carbon, activated, and; 1086, 1808 filtration and, 1255, 1485 chlorine dosage and, 158 chlorophenols and, 158 coal filtration and, 942 concentration and, 158 lime treatment substitution and, 957 mains, new, and, 159 oxychlorophenol formation and, 158 permanence and, 158 permanganate, dosage and, 158 road drainage and, 1090 roof (tarred) drainage and, 954 season and, 1090 sewage and, 1090 superchlorination and, 159 thiosulfate addition and, 158 prechlorination and, 319 superchlorination and, 1617 Tabellaria and, 770 see Carbon, activated; Chlorination; Taste and odor Chlorine; manufacture, electrolytic cells for, 1803 Chlorine absorption; alkalinity and acidity and, 937 -chlorine concentration diagrams (A.D.M.); temperature and, 1255 value of, 1254 humus and, 304 light and, 937 permanganate demand and, relationship, 304, 757, 906 sewage and, 304 see Pollution Chlorine absorption, determination; ammonia and iron and, 758 methods, 937

moval; Manganese removal;

Microscopic organisms;

C

Chlorine, free, determination; 920 acidification and, 304 active, methods, comparison, 1471 apparatus, automatic, 320 color discs and, 472 methyl orange and, 1471 titration, thiosulfate, α-naphtho-flavone indicator, 308 o-tolidin; ammonia and, 1098 apparatus, 474 factors, 964 iron and, 1471 manganese and; 453, 945, 1253, 1471 correcting for, 760 nitrite and, 1471 reliability, 1471 see Chloramine; Hypochlorous acid Chlorophenol; see Chlorination, taste and odor Cholera; Asiatic, water-borne, 1475 Bankok, Siam, water purification and, 596 Madras and, 789, 2049 see Vibrio Choussy; well, water, arsenic and, Chromate; corrosion prevention and, Chûte-à-Caron Hydro-Electric Project; see Alcoa Power Co. Cincinnati, O.; B. coli; per capita contribution of, 450 tests, comparison of mediums, 955 chlorophenol taste, roof water and, ammonia and, 954 filter resanding, 945 reservoir, Chironomus contamina-tion and, 958 typhoid and, 457 Citrate; see Bacteria, colon group Cladothrix; pH and, 166, 1476 see Bacteria, iron Clarifier; Dorr, 600 see Coagulation basin; Softening Clark County, Ind.; school supplies, Clarksburg, W. Va.; manganese, 467, Cleveland, O.; ammonia-chlorine treatment, 1080 Baldwin filtration plant and costs, Clinton, Okla.; water supply, 964 Cloverdale, Ind.; typhoid fever epidemic, 784

water supply, new, 784

after-precipitation and, 609

Coagulation; 916

val:

sms:

ool;

era-

617,

964,

238

808

nd,

nd,

a-

10

nd

08

55

1;

alum and; 470, 768 acid and, 163, 308 agitation and, 599, 907, 1477 carbon, activated, and, 1808 dosage; 596, 756, 1464 control, "residual" test and, 930 prechlorination and, 1238 floe; plankton and, 1238 prechlorination and, 1238 temperature and, 1238 H-ion concentration and, 144, 163, 599 lime and, 322, 464, 757, 963, 1804 residual alumina and; carbon, activated, and, 1808 pH and, 924 prechlorination and, 319 sodium aluminate and, 614 sodium aluminate and, 614 temperature and, 144 alumino-ferric, corrosiveness and, 938 barium chloride and, 768 carbon, activated, and, 1495 chlorinated copperas and; 144, 318, 461, 964 pH and, 470 chlorine and, 319 developments, 456 dosage; control, pH and, 465, 471 pre-sedimentation and, 2043 ferric chloride and, 318 floc formation; judging, 1487 observing, beam of light in basin and, 1487 H-ion concentration and, 961, 1488 industrial wastes and, 451 iron and lime; 956 filter sand incrustation and, 144 popularity, increasing, 144 iron sulfite or Jewell iron process, 956 lime and, 768 mixing and; 470, 964, 1487 period and, 144, 292 velocity and, 296 settling period and, 144 small supplies, potassium and ammonium alum and, 162 sodium aluminate and; 144, 461 corrosiveness and, 938 taste and odor producing sub-stances, removal by, 1495 turbidity, artificial, and, 144 see Iron removal; Manganese removal; Microscopic organisms; Railroad; Swimming pool Coagulation basin; 608

bottom; pyramids and sludge cocks in channels, 939 sharp slopes and, 1080 triangular channels and, 1477 clarifier and, 609, 786, 2043 design, 1080 effluent turbidity and, 609 flow rate and, 609 new, 932 practice re, 470 retention period, 292, 470, 599, 617, 963 see Sedimentation basin Coal; washing waste, coagulation; and filtration, 768 and settling, 910 waste, pollution and, 1097 see Boiler furnace; Filtration, rapid sand; Mine Coatings; "Alumet," 912 iron oxide formation on surface, 912 metallic, nor tests of, 1094 nonferrous, corrosion testing, 912 see Iron corrosion; Lead; Paint; Pipe coating Cobalt; bacteria and, 1235 Coeburn, Va.; iron removal, 782 Coelosphaerium; dead ends, taste and, 953 Cofferdam; construction, 1240 Coke plant; see Gas and coke works Colliery; see Coal; Mine Colloid; removal, acid and alum coagulation and filtration and, 308 see Boiler corrosion; Boiler foaming; Boiler priming; Boiler scale Color; causes, 2045 wasting from lake bottom and, 929 Color determination; 2045 Color removal; alum and; 1236 and acid, and filtration through cloth, 308 dosage, 784 filtration, pressure, and, 925 pH and, 924 and sodium aluminate, 614 carbon activated and; 1495 filtration and, 312, 1485 reaction and, 1236 chlorinated copperas and; 318, 461, 466 pH and, 925 ferric chloride and, 318, 924

ferric salt and, 1236

filtration; through coal, 942

prechlorination and, 319 iron and lime, pH and, 924

lime-soda softening and, 2042

prechlorination and, 782, 925, 1236 Colorado River; water quality, 929 see Books; Metropolitan Water Dis-trict of Southern California Columbia River; gaging cable, 588 Columbus, O.; booster station, new. main cleaning, 156 softening; excess lime vs. limesoda, 931 sludge production, 956 Community Water Service Co.; see Greenwich, Conn. Complaints; minimizing, plant inspection trips and, 616 Concrete; coating, me gate mortars and, 1472 metallic-aggrecracks, waterproofing and, 1253 heating, strength, workability and setting time and, 585 making of, improvements and, 469 permeability; compounds and, 1090 determination, 909, 1253 strength; mixing water composition and, 1474 waterproofing compounds and, 1090 waterproofing, integral and surface, 1253 see Books; Dam; Reservoir; Tank Condenser; brass tube, cracking, stresses and, prevention, 1469 growths, prevention; 314 chlorination and; 319, 1084, 1092 ammonia and, 617 intermittent, and, 1092, 2039 copper sulfate and, 1084 chloride determina-Conductivity; tion and, 1801 water, preparation, 914 Conduit; alternate stages and critical depths, formulas, 145 bryozoal growths, chlorination and, 1260 concrete, construction, 301 see Aqueduct; Books; Pipe Connecticut; Ware and Swift River diversions, suit re, 454, 752 watersheds, reforestation, 925 Consolidated Irrigation Dis District, Irrigation Cal.; Venturi meters, 751 Construction; see Books Consumption; Berkely, Cal., 754 Berlin, Ger., increase and, 1255 Beulah Beach, O., 312 Beverly Hills, Cal., 786 Bloomington, Ill., 588 Brisbane, Australia, 2038 California, Southern, 786 classification of, value, 1475

Cuba, 462 Denver, Colo., 779 England, increase and, 165 fire fighting and, 1252 Germany, increase and, 1105, 1486 intermittent supply and, 591 Johannesburg, S. A., 921 lawn sprinkling and, 1240 London, Eng., 2038 Madras, 789 maximum, provision for, limits and, 1465 metering and; 748, 949, 959, 1242 selective and, 153 Michigan, 620 Milton, Mass., 949 Ohio, 959 Pittsburg, 156 population and, 959 Preston, Eng., 455 rates and, 754, 1242 Regina, Sask., 755 Richmond, Va., 784 Sacramento, 778 St. Catharines, Ont., 756 St. Louis, 153 San Antonia, Tex., 942 Shanghai, 1477 Sheboygan, Wis., 1240 South Bend, Ind., 586 Wellington, N. Z., 162 Contract; bid, clerical error and, 765 lowest responsible bidder and, law and, 765 municipal, public official involve-ment and, 1100 rescinding of, law and, 941 state limit, in excess of, legality, Contractor; bonding companies, responsibility of, 766 employees and property, safeguard-ing, law and, 766 Cook County, Ill.; Cermac pool, 1484 Cook County Forest Preserve District, Ill.; new swimming pool, Coolidge Dam; construction, 1082 Copenhagen; iron and manganese and, 586 Copper; bacteria, adaptation to, 754 corrosion, protection, chromates and, 1254 health and, 946 removal, base exchange and, 935, 1102 water sterilization and; 1235 B. coli and, 1235 welding of, 1237 see Chlorination; Microscopic or-

1236

Dis.

88

lew,

me-

866

in-

re-

and

090

ion

nd,

ce,

ıg,

92

39

a-

al

d,

ganisms; Pipe, copper; Services; Swimming pool Copper detection; colorimetric, "direct green B" and, 1803 small amounts and, 1237 Copper determination; colorimetric, 1805 Copper sulfate treatment; 595, 611, 618, 788, 922, 945, 946, 1256, 1618 algae and, 318, 321 Aphanizomenon and, 770 application, methods, 595, 769 filter, rapid sand, influent, and, 616 health and, 769 liver cirrhosis and, 769 Protococcus and, 778 of reservoir, pond lilies and, 616 swimming pool and, 318 Synura and, 770 Uroglena and, 770 see Condenser Corpus Christi; La Fruta Dam; and cost, 446 failure, 584, 743, 744 Corrosion; drop experiments, 1803 prevention, 1091 protection; cement and, 614 films and, 1621 metallic coatings and, 614, 1091 rust and carbonate, removal, acid and inhibitor, 614 tests; continuous circulator for, 305 rate determination, 314 theory; 1469 electrolytic, 1085, 1469 types of, 1474 see Boiler corrosion; Books; Coating; Engine, Diesel; Filter; Hot water system; Iron; Lead; Pipe corrosion; Railroad; Soil; Steel; Zinc Corrosiveness; aeration and, 1805 bibliography, 945 calcium carbonate saturation and, carbon dioxide and, 1104, 1105, 1805 chlorination and, 1097, 1106 coagulation; alumino-ferric and, 938 sodium aluminate and, 938 protective, formation, coating, oxygen and, 758 dechlorination and, 1106 hot well water and, 778 hydrogen-ion concentration and,

1104

magnesium

lime treatment and, 929

through and, 1256

marble, filtration through and, 1805

filtration

oxygen and, 767, 1104, 1469 red water; aeration and, 607, 929 carbon dioxide and, 466, 929, 1096 cause and, 920 H-ion concentration and, 929 lime and, 1096, 1620 prevention, 466, 920 "Purite," contact with, and, 930 sodium carbonate treatment and, 938 temperature and, 947 treatment and, 313, 767, 945
see Acidity; Calcium carbonate; Carbon dioxide removal; Corrosion; Hot water system; Iron corrosion; Lead; Pipe corrosion; Soil; Steel Cost; see Books Cotton; finishing plant, water purification and, 1486 see Textile Covington, Va.; aeration, 782 Creamery; see Milk Crenothrix; 786, 1260 pH and, 166, 1476 see Bacteria, iron Cresol; see Carbon, activated Cresol red; pH range and salt error, 602Cross-connections; 780 check-valves, double, and, 1486 chlorinator and, 319, 1486 pipe sections, removable, and, 1486 regulation, state, and, 781, 791, 1485 sewage pump priming and, 782 see Swimming pool Crustacea; 595 carbon dioxide, hydrogen sulfide and oxygen and, 906 superchlorination and, 770 Crystalite; preparation, 1107 see Softening Cuba; metering and, 462 rates and, 462 water works and consumption, 462 Cumberland, Md.; water; iodine content, 2037 supply, 952 Curb cock; compression cock substitution, 1497 Current meter; 586, 613 measurements, evaluating, 769 Price, 588 see Flow Cyclops; chlorination, ammonia and, 1098

Czechoslovakia; sanitary engineering

spa problem, 763

Dairen, Japan; water supply and sewage, 596 Dam; 927 Ambursen-type, record height, 583 arch, analysis by trial load method. 746 concrete; 742, 745 arch; construction, 742, 1464 cost, 447 multiple, 1239 construction, shrinkage, cooling system and, 742 failure, 441 gravity; 293 arched; 742 foundation procedure. 741 construction, 443, 468, 741, 742 construction, 456, 1082 design; 456 underpressure and, 166 diversion, construction as concrete "obelisk," 741 earth; 299, 455, 457 construction, 440, 443, 446, 744, 1464 core; exploration, methods, 743 material, sodium carbonate treatment of, 440 settlement, 447 drainage and, 744 failure, 440, 743, 744 high, 293 hydraulic-fill, core and; constancy, 743 materials and, 743 sampling and testing, 743 materials; data, 743 seepage through, rate determination, 447 selection, 743 and rockfill; construction, 608 olliways, blocking of, danger and, 1248 spillways, embankment, core wall, cellular, 745 erosion; 293 cushion pool and; 742 and bucket deflectors, 293 model studies, 297 failures, 456 gravel and loose rock, 295 gravity; design, 742 uplift and, 742 high; danger, sources of, 1082 design, 1082 foundation requirements, 1082 limit and, 1082

D

D

D

prechlorination and ammonia-

types, preference and, 1082 hoof type, 1249 Japan and, 770, 932 largest in United States and abroad, 296 masonry; cyclopean, 745 raising and, 296 rubble, central screen and, 1250 rock, construction, 447 sites, geophysical exploration and, 938 spillway; capacity determination, current meters and, 1083 concrete flash-boards and, 301 see Barrage; Books; Cofferdam Danvers, Mass.; cement-lined pipe, 949 Danville, Ill., see Interstate Water Co. Danville, Va.; open reservoirs; chlor-ination and, 787 tadpoles, "frog fence" and, 787 Daphnia; 926 Deacidification; see Acidity; Carbon dioxide; Corrosiveness Deseration; see Boiler corrosion; Boiler feed water treatment Decarbonation; see Carbon dioxide removal Dechlorination; 1804 apparatus, 743 bisulfite and, 319, 1487 carbon, activated, and; 319, 459, 768, 914, 1238, 1495, 1617 filtration and; 292, 1255, 1485, 1806, 2043 ammonia and, 309 chloramine and, 309 concentration and, 308 cost, 312 rate and, 308, 1485 regeneration; 1088 frequency and, 309, 312 heating and, 309 soda and, 309 steam and, 309 unit; domestic, 1485 size required, 309 pH value, alteration and, 1255 powdered, chloramine and, 1808 reaction and, 1252, 1255 charcoal and, 908 coal filter and, 942 corrosiveness and, 1106 sulfite and, 1617 sulfur dioxide and, 319, 948, 1617 thiosulfate and, 302, 319, 919

see Taste and odor

Defiance, O.; softening, 957

taste and odor, activated carbon,

and

, 583 hod,

oling

lure,

741,

rete

744,

13

ate

on-

er-

ger

ar,

chlorine and, 957 Degasification; see Boiler feed water treatment Delaware River; New York diversion controversy, 751, 931, 943, 1245 Denver, Colo.; consumption, 779 Eleven Mile Dam, 447, 580, 779 Moffat tunnel, 779 turbidity variations, "electric eye" and, 1465 water supply; and extensions, 779 financial data, 779 Depreciation; maintenance and replacements and, relation, 1466 see Accounting; Books Des Moines, Ia.; water supply, 1092 Dessau, Ger.; water quality, 1805 Detroit, Mich.; emergency organization, 1464 filter plant, new, sand and washing data, 454 intake tunnel explosion, 294 pipe, iron, welded, 317, 445 reservoirs, new, cost, 747 Roseville supply main, meter and, 445 service to outside communities, terms and, 147 sewer-tunnel failures, 294, 301 swimming pool supervision, 761, 763 typhoid reduction, 2041 Detroit Edison Co.; feed water treatment, 1083, 1107 Diarrhea; water-borne, 1475 see Disease Diatom; see Odor Dinobryon; chlorination and, 1465 Disease; elimination, progress and, 2045 water-borne; ground water supplies and, 470 intestinal; drought and, 465 epidemic, U. S. Navy vessels and, 932 sterilized polluted water and, 451 liability and, 148, 1482, 1496 wells and, 471, 1496 see Arsenic; Cholera; Diarrhea; Dysentery; Gastro-enteritis; Goiter; Health; Helminth; Jaundice; Protozoa; Schistosomiasis; Teeth; Typhoid; Water sickness; Worm Disinfection; contact period and, 944 mechanism of, 944 studies, 464 Distillery; waste pollution, odor and,

Distribution system; contamination; intermittent supply or low pressure and, 591

typhoid and, 158 dead ends; corrosion and, 1103 flushing of, 317, 469

extensions, w law and, 454 water company and,

fittings, etc., stock and, 469 fire protection and, 780 hydrant flow tests, 472

hydrogen sulfide production in,

investment, proportion of total, 145 maps and records, value, 469 new; cost, 147

financing, 147

operation cost, proportion of total,

pressure, high, and, 943 small town and, construction, 468 surveys, flow and pressure, 946 valve spacing, 780

see Accounting; Bacteria; Bacterium coli; Electrolysis; Leakage; Main; Pipe; Valve; Water unaccounted for

Ditch; see Trench Divining; see Books

Dix River; see Kentucky Utilities Co. Drain; overflow, damage, liability and, 162

Drainage; see Books Draparnaldia; pH, iron, temperature and light and, 906

Dresden, Ger.; taste, activated car-bon filtration and, 312, 1806 water purification, 1806

Drinking fountain: contamination,

highway, 920

Drought; see Rainfall
Dublin, Va.; softening, 782
Duke Power Co.; Catawba River
power system, 293

Duncan, Okla.; Diesel engine, economy and, 960

Dundee, Mich.; softening and purification plant, 944

taste and odor, activated carbon and; 944 filters, 1252

Dundee, Scotland; reservoir contamination, gulls and, 1251
Durban, S. A.; water supply, 1478
Dürkheim, Ger.; springs, 1615
Düsselderf. Ger.; springs, 1615

Düsseldorf, Ger.; proposed water supply, 1615 Duxbury, Mass.; Diesel engine drive,

Dye; waste, color absorption with peat and powdered wood, 1084 Dyeing; water, difficulties and, 1468

Dysentery; Manila, P. I., 585

water-borne; 1475 epidemics; in United States and Canada, 1920-9, 1482 on United States Navy vessels, 932

E

EE

E

E

E

E

F

E

E

E

E

E

F

F

H

H

F

H

I

H

I

see Disease

E. C.; disinfection with, 918

Earth; see Dam; Excavation; Geophysical exploration; Soil

East Bay Municipal Utility District:

consumption, 754 financial data, 593

Mokelumne project, completion, 296

pipeline, submerged, repair, 749 rates, 593

Sacramento River supply, proposed, 754

San Francisco emergency supply contract, 589, 776 water cost, 754

East Chicago, Ind.; intake, new, 941 typhoid, 791

Eastport, M rubber, 147 Md.; main, submerged, typhoid epidemic, 147

water supply, new, 147 Echo Dam; see United States Bureau

of Reclamation

Edinburgh, Scotland; sewage, examination for typhoid-paratyphoid bacilli, 931

Egypt; irrigation, 296 schistosmiasis and, 595 waters of, 786 see Books

El Paso, Tex.; ice manufacture, court decision re, 452

services, 1497 Electric motor; induction, load variations and, 1101 selection for pumping plants, 960,

1101

synchronous, advantages, 959 Electric power; rates, 449 Electrolysis; 949

pipeline currents and, soil resistivity and, 1494

stray current; 914

protection and, bibliography, 911 return feeders and bonding of rails and, 146

see Pipe corrosion Electroösmosis; 935

water purification and, 2040 Eleven Mile Dam; see Denver, Colo. Eliot Glacier; flow, 300 Elkins, W. Va.; water supply, emergency, 465, 765 service; organizations Emergency and methods, 1464 Engine, Diesel; cooling water, corrosion and, 612 efficiency, 961 selecting, 945 silencing, 445 see Books; Pump; Pumping station Engine, gasoline; see Pumping station Engine, oil; see Well Engineering; see Books England; consumption increase, 165 goiter, iodine and, 937 Water Pollution Research Board, report, 1930, 313 water supply developments, 165 Enteric fever; see Typhoid Enteritis; see Gastro-enteritis Eosin; see Ultra-violet Eosin methylene blue agar; see Bacterium coli test Erie, Pa.; new filter plant, 616 Erie Lake; nets, deterioration and, 911 Esch; water supply, 2036 Esk River; pollution, 1097 Essex Border Utilities Commission; algae, iron and lime coagulation and prechlorination and, 1238 filter plant; extension, proposed, 1806 operating cost, 1239 sand coating, 1239 Estimating; see Books Evansville, Ind.; intake, 149 Evaporation; 936 data, 1079, 1614 see Reservoir Everett, Wash.; supply line, freezing of, 292 Excavation; machine vs. hand, cost and, 776

with

68

and

ves-

ieo-

ict:

on,

ro-

ply

941

ed,

au

mid

rt

1

0,

Exmouth, Eng.; swimming pool, 2037
Extensions; see Distribution system;
Financing

Fairmont, W. Va.; acidity and hardness, drought and, 465
Fairport, Ia.; manganese, 916
Farm; water supplies, 458, 473
Faucet; see Tap
Feces; B. coli; -B. aerogenes ratio, 153
content, 450
-like organisms in, 1471

see Trenching

Ferric; see Iron Ferrous; see Iron Filter; Berkefeld, impregnated with Katadyn silver, 769 coal, Bühring, 459, 768 corrosion in, 309 meta-, 768 tap, 309 ultra-, Chamberland impregnated with gelatin, 768 Wangner, 159 Filter, non-submerged; 1087 cleaning, 1261 efficiency, 1261 oxygen dissolved and, 1261 rate, 1261 see Filtration, slow sand Filter operator; training of, 609, 926, 944 Filter, percolating; see Filter, nonsubmerged

Filter, percolating; see Filter, nonsubmerged
Filter sand; analysis, sieve calibration, advisability, 1242
hydraulic characteristics, "meansurface-area diameter" and, 1245
incrustation, sulfite wastes and, 928
screening, 945

size determination; microscopic examination or projection and, 1245 sieve tests and, 1245 specific gravity, determination, 454 specifications; effective size and uniformity coefficient and, suitability, 1242 seq., 1487 sieve test results and, 1242 seq. washing, machine for, 928 see Filtration, rapid sand; Filtra-

tion, slow sand; Sieve
Filtration; 322, 1096
advisability, 1097
apparatus, for continuous, 305
and chlorination vs. chlorination
alone, 793
clogging, iron and, 2037
cloth coated with alum, 308
coco matting and, 939
cost, 915
extent employed, 457, 581, 782, 1807
filtered water, contamination with
raw, typhoid and, 463
ground, artificial; efficiency; 1806

frost and, 1804 and slow sand compared, 306 horizontal, 168 manganese and, 467 microorganisms, prechlorination and, 595 plant; 601, 770, 944 new, 1102

supervision, 756 temperature and, 447 theory, 308 typhoid and, 1262 see Iron removal; Sewage; Silver Filtration, double; 167, 456, 916, 1618, 2038 see Filtration, slow sand Filtration, pressure; obsoleteness, 144 plant; mobile, 919 new, 161, 307, 925 replacement by gravity, 784 see Swimming pool Filtration, rapid sand; 1105 air binding; algae and, 450 bibliography, 1613 correcting, 450, 471 negative head and, 450 pump leakage and, 450 sand loss and, 450 theory, 450, 1613 bottom, false, and, 617 coal as medium, advantages, 941 copper sulfate treatment and, 616 efficiency; 1261 low, causes, 471 prechlorination and, 319, 1804 turbidity removal and, 2042 experiences, 468 flow indicator, inexpensive, 601 gravel; copper screen over, 617 depth, 445, 1080 microörganisms, removal, 1618 operating cost, 596, 756, 926, 963, 1239 overloading; 471 prechlorination and, 471, 1478 pipe gallery, hangers for handling fittings, etc., 953 plants; 468, 596, 608, 621, 779, 943, 956, 963, 1241, 1464, 1808 construction, efficiency guarantee and, 956 cost, 596, 921, 932, 1080 design, experimental plant and, 786 new, 167, 445, 464, 465, 616 776, 784, 786, 921, 925, 932, 942, 958, 1080, 1096, 1240, 1477, 1487 rate; 445, 456, 471, 1080, 1477, 2043 controllers, 449 regulating devices, 593 runs; 596, 1106 air binding and, 471 carbon, activated, and, 788, 956, 957, 1492, 1493 coagulation, mixing and, 964 head loss, final, and, 953, 1478 microörganisms and; 471, 608, 964, 2042

coagulation and; alum and, chlorinated copperas and. 292 iron and lime and, 292. 1238 prechlorination and, 926 prechlorination and; 319, 1238 ammonia and, 964 sand size and, 771 temperature and, 771 sand; activated carbon, penetration and, 1493 condition, wash rate and, 1243 cracking; algae and, 2042 prechlorination and, 319 at walls; algae and, 953 angle piece and, 953 craters, formation of, 1244 depth; 445, 454, 771, 1239, 1243 effective, 1244 deposits; 1239 black, manganese and, 1253 calcium carbonate; 755 carbonation and, 471 removing hydraulically, 1243, 1244 grading hydraulically, 1244 mud balls; algae and, 2042 prechlorination and, 319 prevention, 471 removing, screening during wash and, 471 sand size and, 771 wash rate and, 471, 771 replacing, and costs, 945 size; 144, 445, 454, 771, 945, 1080, 1239, 1243 seq. 30% as index, 164 specific gravity, coatings and, 454 studies, 1487 studies, 1367 turbidity; of applied water, 609, 1238, 1477, 2042 of effluent; 470, 609, 2042 flocculated, 470, 609, 2042 underdrains; 1478 porous concrete and, 1478 trend and, 144 units; idle, taste and, washing prior to use and, 1495 wooden, circular, 956 wash; 596 air-water, 167, 1106, 1483 need of, criterion; floc in effluent and, 1100 head loss and, 1100 rate; 144, 445, 454, 771, 953, 1080, 1243, 1244, 2042 temperature and, 771 sand expansion and; 454

F

as criterion, 163, 617, 2042 factors, 163, 617 measuring, 454, 471, 617 sand; coatings and, 164 density and, 164 size and, 164 temperature and, 164, 471, sand loss and; 471 coatings and, 454 sand size and, 771 troughs, height; 617 adjustable, 1080 water, percentage; 926, 1106, 1478 algae and, 1483 coagulation, mixing and, 964 prechlorination and, ammonia and, 964 see Filter sand; Tank Filtration, slow sand; 1105 carbon addition, loss of head and, cleaning, conveyor transportation of sand and, 767 cost, 615 efficiency; 789, 1260, 2048, 2049 prechlorination and, 1804 gelatinous growths in collecting system, 2048 ground filtration and, comparison, 306 history, 586 hydrogen sulfide in effluent, 789, 1260, 2048 India and, 591 output per acre cleaned, 473 oxygen dissolved reduction and, 1087, 1261 phenol removal, temperature and, plants; 448, 779, 1241, 2038 new, 615 pore volume and, 1087 prechlorination and, 789, 2048 prefiltration and; 167, 599, 767, 1092, 1483, 2038 output per acre cleaned and, 1092 percolating filters and, 789, 1261, 2049 rates and, 473, 1261 raking, 615 rate, 789, 1260, 2048, 2049 resanding, cost, 615 runs; 615, 1260 prechlorination and, 1260 sand; size, 615, 1087, 1260 washer, Nichols, 615 washing, cost, 615 "Vulkanit" and, 1087

see Filter sand; Manganese removal

n and

as and,

1, 292

238

netra-

243

9

43

1253

eally,

iring

080,

454

609,

rior

ent

80,

Financing; 321, 585, 1248 bond issues; for construction, increase in cost and, legality, 454 taxation and, 462 bonds, repudiation by municipality, 941 current business expense, payment from earnings, court ruling and, extensions, earnings and, 944 transfer by municipality, funds. legality, 462 improvements, private citizens and, municipally-owned systems and; budget and, 291 capital expenditures, long-term programs and, 291 small and, 468 new works, state aid and, 923 privately-owned works and; 1466 budget and, 1466 reserves and, 1466 securities, permanent, balancing, court ruling, 462 water certificates, municipal indebtedness and, 941 see Accounting; Contract; Distribution system; Rates; Water, gratuitous Findlay, O.; lime-zeolite softening plant and cost, 957 Fire hydrant; 780 freezing prevention; 1240 salt, damage and, 1241 inspection, frequency, 146, 1240 installation, 1497 thawing; 949 steam vs. electric, 1241 see Fire protection: Hydrant; Pipe joint Fire insurance rates; water supply and, 1099
Fire loss; insufficient water and, company liability and, 1100 Fire protection; charging for, hydrant rentals and, 1249 consumption and, 1252 distribution system and, 780 flow requirements and, 1252 pressure and; 780 high, system, 943 pump capacity and, 780 storage; elevated, and, 1096 requirements, 780 water supply and, 1249 Fire protection, private; see Sprinkler

system

Fish; beet sugar waste pollution and,

H-ion concentration and, 1246 industrial wastes and, 467

nets, deterioration and preservative treatment, 911

oxygen dissolved, minimum and, 452 see Carp Flint, Mich.; Flint River pollution and, 793

meter reading, piecework pay and, 153

Flint River; pollution by Flint, Mich.

Flood; control; 746

costs, Federal Government and, 297

reservoirs; equalizing effect, determination, 769 sites, field examination, 747

Books; Middle Rio Grande;

Mississippi Floodway; flow, friction factors, 582 Florida; ground water; drainage wells

salting, 443 Flow; channels, open; and closed, bends and, 446

critical depth and, 1477

dam spillway, measurement, current meter and, 1083

discharge, high velocity and large volume, control, 1477

hydraulic jets, damage and, avoiding, free vortex principle and, 1477

Books; Channel; Floodway; Pipe, flow; Stream; Water measurement

Fluorescein; see Ultra violet Fluorescence; determination, 1801 as pollution indicator, 1801

Fluorine; mottled tooth enamel and, 463, 475

Ford, Mich.; typhoid and water supply, 2042

Forest; see Water, ground; Watershed Fort Lee, N. J.; sewage discharge court order violation, fine and, 1489 Fort Lewis; swimming pool, 776

Fort Lyon Canal; flow measurement, 750

Fort Valley, Ga.; iron and carbon dioxide removal, 2041

Fostoria, O.; spurious B. coli tests, 955

Fountain; water system, design, 585 see Drinking fountain Fox River, Ill.; pollution study, 452

Fragilaria; taste and odor, chlorineammonia treatment and, 963 France; industrial waste disposal Gib

Gill Gla

Gla

Gla

Gle ts

Gle

Glo

Goi

10

10

W

86

7

g

8

m

86

n

W

86

C

W

1

8

Gre

0

2

Gr

Gr

Gr

Gr

Gr

Gre

Gre

Gre a

Gra

Gra

Gra

Gra

m

14 Goo

n

regulations, 2045 water quality standards, 2045

Frankfurt, Ger.; corrosiveness, marble filters and, 1104

electric plant, feed water, phos-phate and, 1259

piston pump, new, 165 Frederick, Md.; new pipe line, 318 Freeport; Mississippi River, manganese and, 922

Freezing; sea water purification by, water purification and, 470

see Fire hydrant; Services Freezing point; see Mineral content Fuel; see Boiler furnace; Books; Coal Fukushima; water, typhoid bacilli, longevity in, 920

Fungi; chlorination, copper and, 939

Gallionella; pH and, 166, 1476 see Bacteria, iron

Galvanized iron; corrosion, protection, chromates and, 1254 see Pipe; Zinc

Ganges River; water, vibriocidal properties, 1804

Gary, Ind.; intake, 149

Gas and coke works; ammonia liquor, phenol removal, activated carbon and, 309

liquors, phenol determination, 1802 wastes; biological treatment, 935 phenol recovery; 783

benzol extraction and, 935 spill of, notification and, 607 see Phenol

Gases, dissolved; solubility and supersaturation, principles and laws re, 1613

Gastro-enteritis; epidemic, waterborne, preceding typhoid outbreak,

see Disease Geophone; 949

Geophysical exploration; methods, 938

tunnel construction and, 580 Germantown Dam; core explorations,

Germany; consumption increase and, 1105, 1486 ground waters, 1105 pumps, piston, 165 sewage boards and, 1093

water supply and; 1255, 1486

laws and, 906

Gibson Dam; see United States Bureau of Reclamation
Gillam, Man.; typhoid outbreak, 298
Glacier; see Eliot
Glasgow, Scotland; filters, early, 587
Glass; silver adsorption, oligodynamic action and, 309
Glencoe, Ill.; intake, 149

taste and odor, super- and dechlorination and, 1487

Glendale, Cal.; reservoir, roof removal, protococcus growth and, 779 Glossop, Eng.; lead solvency and, 1479 Godalming, Eng.; new reservoirs, 613 Goiter; diet and, 912, 913

iodine and; 168, 313, 463, 583, 781, 912, 913, 918, 937, 1085, 2037

bibliography, 583 iodized salt and, 583

d

ıl

g

water-borne infection and, 583, 1475
see Books

Grand Gorge, N. Y.; disposal works,

Grand Prairie District, Alberta; geology and water resources, 1615 Grand Rapids, Mich.; softening sludge, disposal, 772, 1108, 1109 Grant's Pass; filter plant, new, 776

metering, 776 services, copper, 776

Great Britain; pollution; Land Drainage Act of 1930 and, 927, 931
prevention, 594
stream classification and, 594
reservoir safety provision act, 1250,

1482 water committees, regional, 306 see Books; England

Great Diamond Island; pipeline to, construction, 946

Great Lakes; region, typhoid and water supply and sewage conditions, 1265

see Chicago Sanitary District; Michigan Lake

Great Northern Railway; boiler washout storage, concrete tanks and, 2047

Great Southern Railway, Ireland; softening plants, 311

Greater Vancouver Water District; water quality, 442

Greensand; base exchange value, 1107 see Softening Greenwich, Conn.; filter sand data,

1244 Griffin, Ga.; administration and financing, 321 filter plant, new, 932
Ground; see Earth; Geophysical exploration; Soil
Gull; B. coli and, 948, 1251, 1619
B. typhosum and, 949
see Reservoir
Gunite; see Pipe, steel

Haaren; water supply, 2036 Hagerstown, Md.; Williamsport supply and, 1099

Halazone; composition, 162 see Chlorination

Halifax, Eng.; new filter plant, 1102 Hamburg, Ger.; chlorine and oxygen demand, 757 weter works 1620

water works, 1620
Hamburg, N. Y.; prechlorination, 609
taste, activated carbon and, 609
Hamilton, Ont.; new swimming pool,
761

Hamm, Ger.; activated carbon filtration; 1255

and cost, 312 Hammersmith, Eng.; swimming pool, 306

306 Hammond, Ind.; typhoid, 791

Hampton; Hampton Creek pollution case, 1488 Hannibal, Mo.; filter plant appliances, 601

floc detector, 1100

Hanover, Ger.; typhoid epidemic, 1618

Hardness; 1086 drought and, 465 fuel loss and, 2042 marble, filtration through and, 1105

mine waste and, 1466 nature of, 472, 757

soap waste and, 473, 1488 see Brewing; Laundry; Phorium; Soap; Softening; Textile

Hardness determination; 920 calcium, soap method, 1086 magnesium; Blacher method, 1259 soap method, 1086

methods, accuracy, 1088, 1259 soap method; 606

carbon dioxide, pH and temperature and, 1254 see Calcium; Magnesium

Harrisonville, Mo.; water supply, drought and, 748 Hartford, Conn.; filter plant; new,

operating and cost data, 615 pre-filters, 599 main sterilization, 607 pine friction tests, 500

pipe; friction tests, 599 line, concrete, 607 pitometer survey, 599 reservoir, Nepaug, organic matter and, 599

Hastings Dam; model studies, 297
Hawthorne, Nev.; naval depot supply, Rose Creek flow study, 592
Health; copper and, 935, 946

copper sulfate treatment and, 769 microorganisms and, 595

silver and, 305 water; mineral content and, 913 purification and, 1255

purification and, 1255
see Arsenic; Books; Disease; Lead
Helminth; water-borne disease and,
1475

Hereford, Eng.; new public baths, 761 Hertford, Eng.; new elevated water tank, 150

Highland Park, Mich.; mixing period,

Holland; coastal regions, subterranean water conditions, 1803 copper pipe, committee report, 935 North, provincial waterworks, 1807 State Bureau of Water Supplies, report, 1928, 302

water supplies, group, 921 see Netherlands

Hollins, Va.; sewage plant, 788 Honolulu; water supply; 150 problems, 777

water unaccounted for, 777 Hornsey, Eng.; swimming pool, 931 Hose; see Railroad

Hot water system; corrosion, carbon dioxide liberation and, 1258 see Boiler; Railroad

Houston, Tex.; public school swimming pools, 1483

Hull, Eng.; water supply, 1102 wells, new, marine oil engines and 937

Hume Dam; 744
Humic acid; see Color removal
Humus; see Chlorine absorption
Hungary; goiter, iodine and, 313, 463

Huntingburg, Ind.; rates, 1248 water supply and power plant, 1248 Hydrant; accident and, liability and, 1099

see Fire hydrant; Railroad Hydraulic jump; see Mixing Hydraulics; see Books

Hydro-electric plant; corrosion and its prevention, 1083

draught tubes, 936 ice troubles and remedies, 1081 new, 442 reservoirs, operation chart, 747

at water works, 615

see Penstock; Turbine, water Hydrogen; see Microscopic organisms Hydrogen-ion concentration; adjustment: lime and 163

ment; lime and, 163
"Purite" and, 930
sodium hydroxide and, 1238
aeration and, 607, 930
carbon, activated, and, 1493
chlorination and, 319, 1106
decarbonation and aeration and.

2041 marble, filtration through, and, 1105 sodium carbonate treatment and

607

theory, 474
see Bacteria, iron; Boiler feed water
treatment; Books; Carbon dioxide; Carp; Chloramine; Chlorination; Coagulation; Corrosiveness; Dechlorination; Fish;
Manganese removal; Mosquito;
Railroad; Soil

Hydrogen-ion concentration determination; 919, 961

colorimetric; 601, 603
apparatus, 474
bibliography, 602
colored solutions, dilution
method, 603
in cultures, 915

errors in, 602 indicator salt errors and, 601, 602 quinhydrone electrode and, 1235 recorder, 934, 1094

see Books Hydrogen sulfide; removal; aeration and, 786

diachlor-mutonite process, 1806 see Chlorination; Distribution system; Filtration, slow sand; Microscopic organisms; Pipe, cast iron; Pipe corrosion

Hydrology; 936 see Books

Hypochlorite; E. C., advantages, 918 solutions, decomposition, 909 see Bleaching powder; Chlorination; Reservoir

Hypochlorous acid; determination in presence of chloramines and nitrogen trichloride, 1471

Ice; bibliography, 1082 formation; physics of, 1082 varieties of, 1082 manufacture; algae, chlorination and, 319 ordinance re, court decision and,

452

water treatment and, 1496 regulations, state, 764, 781 see Hydro-electric; Intake Illinois; Health Department, func-tions, 1265 oil-well waters, sulfate-reducing bacteria in, 746 sanitation, 1265 school supplies, 780 sewage disposal, 793 softening and, 294 stream pollution and, 2043 typhoid and, 780 water supplies; drought and, 748 supervision, 783 treatment, 793 wells; abandoned, 783 in limestone, 459, 775 Illinois Central Railroad; Edgewood cutoff, water stations and, 299 water supplies, drought and, 2045 Illinois River; reaeration, rate of, 451 India, British; sewage disposal, waterborne disease and water supplies, 591 Indiana; Calumet District coke plants, phenol recovery and, 783 cross-connections, prohibition of, 791 ground water, lowering of, 791 health and, 1262 mine drainage, sealing and, 1615 sewage; discharge, prohibition of, 791 disposal, 793 State Dept. of Health, functions and accomplishments, 1262 water supplies; drought and, 748, 781 improving, 791 treatment, 793 Indiana Harbor, Ind.; intake, new, 941 typhoid and, 791 Indianapolis Water Co.; elevated tank, new, 782 mains, sterilization of new, 760 Indol; see Bacteria, colon group Industrial wastes; acid, neutraliza-tion, automatic, 1094 filter, Wangner, and, 159

treatment; 161, 621, 2045

and. 1479

activated carbon and, 1256 see Gas and coke works; Mine;

Oxygen demand determination;

Phenol; Sugar; Sulfite Infant mortality; lead solvent water

water purification and, 1255

me

st.

nd,

nd,

ad.

ter

X-

la-

re-

h:

0;

er-

on

02

on

n:

18

n

n

Infiltration gallery; 448, 610, 779, 1092, 1245, 1486 of early date, 587 see Filtration Intake; 944 branches and, 149 design, 920, 1264 ice stoppage, steam and, 149 in lakes; distance above bottom and, 149 ice, depth and 149 new, 444, 616, 932, 941 pipe; material and, 1264 steel, Victaulic joints and, 941 port velocity and, 149, 447 in rivers; 149 eroding bottoms and, 150 screens; 932, 1264 accessibility and, 447 design, 920 ice and, 1082 types, 149 International Paper Co.; Dalhousie, N. B., water supply system, 1239 Interstate Water Co.; North Fork dam failure, 441 Iodine; distribution in nature, 583 in foods, 913, 937, 2037 geochemistry of, 1087 liberation by marine algae, 913 sterilization and, 767, 919, 1484 water and, 1087 water supplies and; 781, 913, 919, 937, 2037 classification re, 781 see Books; Goiter Iodine determination; 913, 915, 918, 921 Iowa University; flow around bends, experiments on, 446 Iron; bacteria and, 1235 content, high, and, 314, 453 filter clogging and, 2037 in lake water, organic matter, carbon dioxide, etc., and, 2037 laundry, stains and, 466 limit, permissible, 448 pipe incrustation and, 166 plumbing fixtures, stains and, 466 see Bacteria, iron; Chlorine, free, determination; Phormium; Softening; Wells Iron, cast; corrosion in water, 1086 see Pipe, cast iron Iron chloride; see Coagulation; Color Iron corrosion; coatings; protective, formation, 469 value, 313

composition and, 313

copper addition and, 313 oxygen dissolved and, 1469 painting and, sand blasting and, protection, chromates and, 1254 suppression, colloids and, 1621 theory; 468 electrochemical, 1494 see Boiler; Coating; Corrosion: Corrosiveness; Iron, cast; Paint; Pipe; Soil; Steel Iron hydroxide; see Coagulation; Color removal; Iron removal Iron removal; 466, 586, 782 aeration; and decarbonation, 2041 and filtration; 166, 314, 448, 596, 1805 through coke, 1101 cost, 596 lime and, 1258 lime and, 1494 base exchange and, 293, 305 coagulation; alum and, 1103 chlorinated copperas and, 1103 diachlor-mutonite process, 1806 filtration, prechlorination and, 319 H-ion concentration and, 925 lime and, 769, 1241 manganese sand and, 1258 marble, filtration through, 1805 Norit filters and, 768 organic salts and; acid and alum coagulation and filtration, 308 bleaching powder and, 169 carbon, activated and, 169 lime and, 169 manganese permutite and, 169 plant, new, 784 prechlorination and alkalinity adjustment and, 1238 Iron sulfate; see chlorinated copperas; Coagulation; Color removal; Manganese removal Iron, wrought; corrosion in water, 1086 see Pipe, wrought iron Irrigation; Alberta and, 951 Egypt and, 296 model studies, 297 underground porous pipe system and, 167 water measurement, Venturi meters and, 751 wells and, 144 see Middle Rio Grande Istanbul; aqueduct and, 774 Italy; sugar waste disposal, 1472 water quality standard, B. coli and,

758

Japan; dams and, 770, 932 Government Railways, Shimzu tunnel, water flows and, 294 sewerage and, 596 water supplies and, 596, 770, 932 Jaundice; infective, water-borne. 1475 Jefferson County; filter plant supervision, 756 Jerusalem; water shortage, 313 Johannesburg, S. A.; consumption, swimming pools, 761 water supply, 921 Jordan Dam; see Alabama Power Co. Jumna River; vibriocidal properties, Jute packing; B. coli and, 773 Kansas; mains, new, contamination and, 760 water supplies, ground, disease outbreaks and, 471 Kansas City, Kans.; typhoid, reduc-tion and, 1100 water and electric plants, improvements and financing, 1100 Kansas City, Mo.; filter operation, laboratory control, 471 purification plant, new, 774 Katadyn; algae and, 1103 Berkefeld candles impr impreganted with, B. coli and, 769 sand; permanence, 305 sterilization and; bacteric power of treated water, 305 bactericidal B. coli and, 305, 474 temperature and, 305 time and, 305 silver, preparation, 304 steritization; B. coli and, 310, 1103 cost, 1103 history, 1103 interfering conditions, 1103 selective, 310 silver, dissolved, health and, 305, 1103 see Oligodynamic; Silver Kearney, Mo.; Diesel engine, economy and, 960 Keijo, Japan; water supply and sewerage, 596 Kentucky; water supplies, drought and, 772, 1098 Kentucky Utilities Co.; Dix River dam, emergency spillway, 301 Kenya; lakes, biology of, 605, 1266 Knoxville, Tenn.; intake, 149 Knoxville Power Co.; see Aluminum Company of America

K

K

L

L

I

L

I

I

Kobe, Japan; water supply and sewerage, 596 Königsberg, Ger.; chlorine demand. determination, 938 filter plant, new, 167 Kyoto, Japan; sewerage and, 596 water supply, 596, 770

ın-

le,

r-

n,

0.

m

Laboratory; 600 kit, portable, 756 mobile, 618, 782 see Purification LaFruta Dam; see Corpus Christi Lagan River; B. typhosum and, 939 Lake; zoning, vertical, 606 Lake Odessa; elevated tank, conflagration and, 1096 Langeloth, Pa.; copper sulfate treatment, 618 filtration, 618 taste, 618

Lansing, Kans.; State Penitentiary, water supply, iron removal, 1494 Laredo, Tex.; intake, 150

Lark River; beet sugar pollution, 785

see Books

Laundry; fabrics; deposits from washing with soap, sodium silicate and hard water, 910 deterioration, hardness and, 473

staining; iron and, 466 manganese and, 467 1253

hardness and, 1468 Lawn; see Consumption

Lawrence, Kans.; standpipe, enclosed in masonry, and cost, 150 awton, Okla.; activated sludge Lawton,

plant, 963 Aer-O-Mix and, 1494

chloramine treatment, 964

Lead; corrosion; 314, 1804 alloys, resistant, 912 calcium hydroxide and, 911, 912 carbon dioxide and, 911, 912 cement and, 911, 912 oxygen and, 911, 912

prevention, bitumens and, 912 protection, chromates and, 1254 soil and; 911, 912

prevention; bituminous coating and, 912

calcium carbonate packing and, 912 wood and, 911, 912

poisoning, literature review, 2038 removal, base exchange and, 935, 1102

solvency; 161 acidity and, 612

carbon dioxide and, 612 infant mortality and, 1479 lime treatment and, 612 oxygen dissolved and, 612 water treatment and, 313 in water; concentration, health and

612 poisoning and: 307 concentration and, 1479

see Pipe, lead; Services Lead detection; biological, 915 Leadville, Colo.; mains, freezing, steam and, 146

Leakage; locating; devices for, 946,

pitometer survey and, 145, 599 wa er hammer method, 950 see Pipe; Pipe, cast iron; Plumbing;

Leather; see Bacillus, leather; Bacterium coli

Lehigh Valley Railroad; Manchester, N. Y., water facilities, 317

Leptospira; chlorination and, 1619 Leptothrix; pH and, 166, 1476 see Bacteria, iron

Levee; hydraulic-fill construction, 297

Level gauge; inexpensive, 601 Lewiston, Idaho; meters and meter reading practice, 779

Lexington Power Co.; intake, 149 Liège; water service, history, 1801 Lignite; see Softening, base exchange Lily; pond, in reservoir, copper sulfate and, 616

Lima, O.; chlorination, taste, roof water and, 954

Lime; vacuum transport of, 958 Lime treatment; 945, 1804 application, method, 755, 1257

sterilization and, 310, 473, 756, 935, 1618

see Acidity; Bacteria, iron; Calcium carbonate; Carbon dioxide removal; Coagulation; Corrosive-Hydrogen-ion concentration; Iron removal; Lead; Manganese removal; Microscopic organisms; Pipe; Railroad; Sew-age; Softening; Taste and odor Linares, Nueva Léon; water and

sewerage project, 1620

Lincoln, Eng.; chlorination, early, Lincoln, Neb.; water supply pollu-

tion, 1614 Little Calumet River; see Calumet Liverpool, Eng.; Aubrey St. pumping station, 1250

Mackworth's Island; pipeline to. bacteriological examinawater, tions, 2037 Llanelly; water works, 612 London, Eng.; artesian water, level lowering, 1476 chlorination; 1617 ammonia and, 473 consumption, 2038 filtration; double, 473, 1618, 2038 Kempton Park primary units, 1092 "leather" bacillus, 1619 lime, excess, treatment, 473 Metropolitan Water Board, report, 473, 2038 reservoirs, gulls, B. coli and, 948, 1619 storage and; 757 purification and, 1618 water; quality, 473 supply; 304, 2038 extensions and, 1102 history, 587 London, Ont.; new pump, 598 London, Midland and Scottish Railway; softening plants, 938 Londonderry; new filter plant, 925 Lorain, O.; water purification during past 25 years, 956 Los Angeles, Cal.; ocean outfall, B. coli surveys, 1089 reservoirs; gulls and, 948 protococcus growths, chlorination and copper sulfate treatment and, 778 sewage reclamation, 588, 923, 1256, 2045 water supply extension, 587 see Metropolitan Water District of Southern California Louisville, Ky.; B. coli, per capita contribution, 450 cast iron pipe, small, long service and, 947 drought and, 1098 Lowell, Mass.; water supply, 1101 Lubricant; see Books Ludgwigshafen; Diachlor-Mutonite process, 1806 Luke, Md.; drought, water supply

Macclesfield; reservoir embankment repair, 1475

Lynchburg, Va.; aeration and, 782 Aer-O-Mix and, 1494

Lyons, France; typhoid and, 307 Verdunization and, 307

problems and, 1238

Lyster bag; see Army

construction, 946 Macon, Ga.; administration and financing, 321
Madison, Wis.; new filter plant, 465 Madras; cholera, 789, 2049 Water and Sewage Purification Committee, filtration experiments, 1260 water supply; 1807 reports, annual, 789, 2048, 2049 Magdeburg, Ger.; filters, corrosion and, 309 slow sand filtration, activated car-bon addition and, 312 Magnesium; see Mineral content; Softening aluminate; solubility, Magnesium 613 Magnesium carbonate; see Carbon dioxide removal Magnesium determination; 8-hvdroxyquinoline and, 1260 o-oxychinolate method, 922 phosphate method; 914 volumetric, 1260 see Hardness determination Magnesium oxide; see Carbon dioxide removal Mahoning Valley Sanitary District; filter, sand size and wash rate, 1243 Main; bridge; bascule, crossing, 937 drawspan, rubber pipe and, and cost, 147 cleaning, 156, 457 coating with bitumen, electrically, 457 dual, advantages and cost, 1095 extensions; financing, 611 new subdivisions, costs, liability and, 1100 failure; causes, 145 cellar flooding, liability and, 162 foundations and, 145 preparing for, 317 freezing, steam introduction and, growths, ammonia-chlorine and, 617 incrustation lime-soda softening and, 156

laying; 317, 469, 1497 railroad fill, in culvert jacked

in trench with gas mains, dangers

new; B. coli from jute packing, 773

chlorination taste and, 159

through, 315 under roads, 306

of, 911

M

1

pollution, persistence, 760 railway tracks and, 146 repair, 1497 road alterations, damage claims and, 1250 sterilization; 319, 607, 611, 760, 922, 948, 1616, 1619 calcium hypochlorite and, 922, 1617 checking, B. coli tests and, 922 thawing, 949 see Calcium carbonate; Corrosion; Corrosiveness; Distribution system; Electrolysis; Leakage; Pipe; Trenching; Valve Maine Water Utilities Association; report on cross-connections, 1485 Managua, Nicaragua; water works restoration, 1238 Manchester, Eng.; filters, early, 587 Haweswater Scheme, 1102 Manganese; alkalinity, chloride and iron contents, relationship, absence of, 1472 aqueduct deposits and, 453 bacteria and, 1235 carbon dioxide and, 1256 coal mining, bituminous, and, 467, 1253 filter; operation and, 467, 1253 sand blackening and, 1253 laundry staining and, 467, 1253 plumbing staining and, 467, 1252 reservoir; impounding, and, 453 unstripped, and, 1256 in water supplies; 916, 922, 1103 content, high, instance of, 453 source of, 453 see Bacteria, manganese; Chlorine, free, determination Manganese determination; methods; 935 colorimetric, 940 comparison, 1472 periodate, 463 Manganese removal; 586 aeration; and filtration; filter generation, permanganate and, 1258 lime and, 1258 slow sand, 453 prechlorination and pH adjustment and, 1238 alum coagulation and, 1103, 1104

B. manganicus and, 767 base exchange and; 305, 615

organic compounds and, 1249

chlorinated copperas and, 1103 chlorination and, 1253

diachlor-mutonite process, 1806

to.

and

tion

eri-

Q

ion

ar-

nt;

ty,

on

y-

X-

43

nd

y,

y

2

ζ

H-ion concentration and, 453 iron and lime coagulation and, 1104, 1256 lime and; 1253 organic compounds and, 1249 manganese dioxide and, 768, 1806 manganese sand and, 1258 organic salts, acid and alum coagu-lation and filtration, 308 permanganate and, organic compounds and, 1249 soda ash and, organic compounds and, 1249 Manggarai, Java; B. coli test, most probable number formulas, study, 1484 water purification laboratory, annual report, 459, 768 Mangum, Okla.; zeolite softening plant and cost, 962 Manila, P. I.; typhoid and dysentery, water supply, sewage disposal and mosquito control, 584 Manitoba; hydrometric investigations, 951 Marble; see Carbon dioxide removal Marion, O.; softening; feed line cleaning and maintenance, 959 sludge, as substitute for agricul-tural lime, 956 Mass.; Diesel engine Marshfield, drive, 164 Maryland; Bureau of Sanitary Engineering, report, 1103 drought of 1930, 468 State Bd. of Health, Upper Potomac River Board and, 951, 1104 typhoid, 1103 water supplies; drought and, 772, 1098, 1103 manganese and, 1103 Maryland-Delaware Water and Sewerage Association; 5th conference, 467 Massachusetts; reservoirs, gulls, legalized shooting and, 948 typhoid data, 780 Ware and Swift River diversions, suit re, 454, 752 water supplies; data, 780 ground, iron and, 1101 watersheds, reforestation, 925 McBryde Sugar Co.; Alexander Dam, construction and failure, 440 Medina, O.; chlorination, taste, roof water and, 954

Meeker, Colo.; water supply improve-

ment costs, 747

Melbourne, Australia; Sylvan Dam No. 1, construction, 744 water supply, 744
Metal; see Copper; Corrosion; Iron; Lead; Oligodynamic; Pipe; Silver; Sterilization; etc. Meter; 586 box, 779, 788 charging for, practice, 295 development, 152 freezing, breakable cast iron frost bottoms and, 146 hot water and, 778 inferential, 934 installation; 779, 788, 1251 practice, 152 time required, 788 location; 1251 at curb; accident and, liability, 1099 advantages, 146, 469, 787 practice, 152 main, large, small meter and, 445 maintenace; 146, 152 cost, 779 ownership; 787, 1251 practice, 152 positive, 934 repair costs, practice, 152 size and, 1249 standardization, 152 testing; 315, 317 accuracy requirement, 779 frequency, practice, 152 practice, 152, 469 thawing, 949 Woltman, 769 see Venturi Meter reading; frquency; 788 practice, 152, 153, 779 piecework pay and, 153 Metering; advantages, 787, 1251 advisability, 1092 Bloomington, Ind., 748 Cuba, 462 Grant's Pass, 776 inadequate, hazards and, 946 legality, 454 Milton, Mass., 949 objections to, 787 Ohio, 959 Roseville, Mich., 147 Sacramento, 777 St. Louis, selective and, 153 Shanghai, 1478 South Bend, Ind., 586 in United States, 152 universal, advisability, 467 Vienna, 1476 Williamsport, Md., 1099

see Consumption Methane; see Microscopic organisms Methyl orange; see Chlorine, free, determination Methyl red; see Bacteria, colon group Metropolitan Water District of South-ern California; Boulder Dam power contracts, 442 Colorado supply; 441 aqueduct; 610, 775, 778 route and cost, 591 quality, 929 water cost, 591 rainfall and runoff, report, 777 Mexico Irrigation Commission; dam core walls, cellular, 745 Miami Conservancy District; hydraulic-fill dams, core tests, 743 Michigan; consumption data, 620 goiter, iodine and, 781 pollution; 621 stream; 792 control program, 1265 rapid sand filtration plants, data, 621 sewage disposal, 793 surface waters of, 620 typhoid reduction, 2041 water supplies, treatment, 792, 793 Michigan, Lake; bacteriological survey, 793 current, regular, absence of, 790 pollution, 790, 1262, seq. Sanitation Congress; -1924, 790 -1925, 1262 sewage disposal and water treat-ment and; 1262 and typhoid, 1265 Micrococci; see Swimming pool Microscopic examination; see Sedi-Microscopic organisms; acid wastes and, 451 aeration and, 595 bacterial population and; 451 increase and, 318, 926 carbon dioxide and, 905 chlorination and; 318 seq., 595, 929, 945, 1092, 1464 ammonia and, 320, 321, 466, 617, 929, 945, 1098, 1247 copper and; 608, 930, 939 apparatus and, 939 coagulation; alum and, 292 ammonium alum and, 318 chlorinated copperas and, 292 iron and, 144, 292 draught, point of, and, 595, 770, 788 food supply and, 321 health and, 595

h

i

1

1

I

ľ

8

M

M

M

M

M

1

hydrogen and, 905 hydrogen sulfide and, 905 sms ree, iodine liberation and, 913 lime, excess, and, 595, 1618 oup methane and, 905 oxygen and; 905 thwer liberation and, 450, 451, 600 purification plant problems and, reservoir, covering and, 945 season and, 618 sewage plant discharge and, 1104 silver and; 309 Katadyn and, 1103 am of Weddell Sea, 606 nyta, 93

Ir-

t-

8

see Chlorination, taste and odor; Coagulation; Copper sulfate; Coagulation; Copper sulfate; Crustacea; Filtration; Filtration, rapid sand; Protozoa; Tabellaria; Taste and odor; Uroglena; etc Middle Rio Grande Conservancy District; flood control, irrigation and drainage project, 295, 1240 Milk; creamery waste, activated sludge treatment, 935 -products waste, treatment, filters and, 1090 waste, oxygen demand and, 295 Milton, Mass.; consumption, waste prevention and water unaccounted for, 949

Milwaukee, Wis.; sewage disposal, 792, 1265 station, new high pressure, 943 water supply, lake pollution and, Mine waste; coal; neutralization and,

2042

pollution; 467 abandoned mines, sealing and, 467, 1615, 2042 acidity and; 1466 low water stage and, 1099 seasonal variations, 1099 theory, 2042

boiler foaming and priming and, 2042 gob piles and, 2042 hardness and, 1466

disposal, 306 well water pollution, taste and, 616 Mineral content; health and, 913 soda-lime magnesia ratio, 1087 detection, variations, freezing point and, 1805

see Water, mineral Mineral Wells, Tex.; bottled waters, sanitary control, 1497 Minneapolis, Minn.; softening experi-

ments, costs and savings, 2042

Minnesota; goiter, iodine and, 781 Mississippi River; flood control; 961

costs, Federal Government and, 297 fascine mattresses, fabrication, 297

levee, hydraulic-fill, construction, 297

New Madrid floodway drainage works, 1247 progress, 746

reservoir sites, field examination, 747

manganese content, 916, 922 sediment, suspended sampling methods, 592

Missouri; drought; typhoid and, 748 water supplies and, 748, 1092 ice and bottled water regulations,

State Bd. of Health, functions, 963 water and sewage works, supervision, 763, 963

and Sewerage Conference, 6th, 468 Missouri, Kansas and Texas Rail-

road; water cars and, 316 Missouri River; cutoffs, 295 Mixing; 932, 939, 942, 956, 1096, 1240, 1487

Aer-O-Mix and, 964, 1485, 1494 basin, baffled; 596, 613, 1238 vs. mechanical, 2043

hydraulic-jump flumes, head loss and, 1080 improving, 1487 mechanical; 466, 617, 618, 786, 958,

1101, 1808 starting torque, reducing, 444

velocity and, 617 period, 617, 963 pump, centrifugal, and, 1238

units of various types; design, 609 power costs, computing, 610 velocity and, 610 see Coagulation; Softening

Moccasin Dam; see San Francisco Molybdenum; determination, 907 Monongahela River; mine waste pollution, acidity and hardness and, 1466

Montana; ground water, 764 water supplies, 755 Montclair, N. J.; new supply, 155

Montreal; pumping plant, 1102 typhoid epidemic, 1618

Moose Jaw, Sask; water supply; investigation, 1241 proposed, 1102

Morgantown, W. Va.; manganese and 467, 1253

Moscow, Russia; water hammer study,

Mosquito; breeding, oxygen and, 599 control; 584 oil and, 298

Paris green and, 298

larvae, pH and temperature and. 1249

Moundsville, Va.; well supply, drought and, 465

Mülheim, Ger.; water supply, artificial lake and, 1093

Munich, Ger.; Venturi meters, 1471 Murray River; sanitary survey, 1094 Muskegon River; flow prediction, 459 Mussel; see Condenser

Nag Hamadi Barrage; construction,

Nagoya, Japan; water supply and sewerage, 596 Nanking, China; drinking water

problem, 1468 National Town and County Club,

Cleveland; swimming pool, 297 Neodesha, Kans.; softening plant, new, and operating cost, 1487 Nepean Dam; see Sydney, N. S. W. Netherlands Railways; Norit filters,

New Albany; intake, 150

New Bedford, Mass.; cement-lined wrought iron pipe, early use of, 949

steel pipe, pitting, 949 New Bremen, O.; iron removal with greensand, 293

New Brunswick, Can.; hydrometric

investigations, 951 New Brunswick, N. J.; new pumping station, 786, 1095

New Caledonia; fresh-water fauna of, 605

New England; drought and, 1483 New Jersey; bathing beaches, protection, 1483

bathing places and pools, 762 Delaware River diversion case, 751, 943, 1245

Fort Lee sewage discharge case, 1489

institutional water and sewage plants, 923 stream pollution, classification and,

762 typhoid, 764

watersheds, reforestation, 925 see North Jersey

New Madrid Floodway; see Missis. sippi River

u

r

N

8

N

Nit

Nit

ł

No

0

(

No

N

N

N

Nit

Nit

New Mexico; conservancy law, 1240 New Orleans; emergency organization, 1464

New Rochelle, N. Y.; valve boxes, raising to grade, 157 New Rochelle Water Co.; main clean-

ing pit, 1481 meters, size and, 1249

New South Wales; water works, state aid and, 923

New York City; aëration and, 611, 770 aqueduct growths, chlorination and. 611

chlorination; 595, 611 super-, 770

copper sulfate treatment, 595, 611,

Delaware River diversion; 931 Supreme Court and, 751, 943, 1245

emergency organization, 1464 Grand Gorge disposal works, 756 mains, new; financing, 611 sterilization, 611, 760, 1616

pipe, cast iron, cement-lined, 611 reservoirs; fencing of, 611

sea gulls and, 611 subway construction, 589 swimming pools, control, 1089 taste and odor control, 769

tunnel; construction, and, 1248 ventilation new; 756

cost, 1248 water supply; extension, 756, 1245 financial statement, 756 watershed protection and reforesta-

tion, 611 New York State; Delaware River di-

version case, 751, 943, 1245 plumbing regulations, 929 watersheds, reforestation, 925 see Books

New Zealand; goiter, iodine and, 918 Newcastle, Australia; steel pipe, external protection, 167

water supply, 923 Newport, Ky.; main bridge crossing, valve insertion and, 157

Newport News, Va.; chlorination, early, 782 prechlorination, 782

taste and odor, activated carbon and, 788, 1493 Newton-le-Willows, Eng.; softening

plant, 939 Nickel; bacteria and, 1235 Nile River; irrigation and, 296 water composition, 787
water supply, Lake Albert and, 166
Nitrate; determination; nitrite, correction for, elimination, 2041
in sea water, 1802
sodium salicylate and, 939, 1471
Norit, filtration and, 768

ia.

a-

88,

n-

te

d,

1,

Nitrite; determination; α-naphthylamine oxalate spot test, 1469 in sea water, 1802

Norit, filtration and, 768
see Chlorine, free, determination
Nitrogen determination; in sea water,
1802

Nitrogen trichloride; determination, in presence of chloramines and hypochlorous acid, 1471 disinfectant action, 1471

Norfolk, Va.; algae, chlorine and ammonia-chlorine and, 929 color, wasting from lake bottom and, 929

copper sulfate treatment, 788 corrosiveness, lime treatment and, 929

filtration, early, 782 prechlorination, 782

taste and odor; activated carbon and 788, 1493 ammonia-chlorine and, 788, 1493 prechlorination and, 788, 1493

Norit filter; experiments with, 768
purification and, 1088
North Carolina drought: streamfe

North Carolina; drought; streamflow and, 449 water supplies and, 1098

filter plant operators, training of, 926

ground water conditions, 449 purification plant report forms, 1486

rainfall and streamflow, recording, 449 North Fork Dam; see Interstate

Water Co. North Jersey Metropolitan District; chlorination, 945

lime treatment, 945
Wanaque; aqueduct, disinfection,

948 project, 770 reservoir; copper sulfate treatment, 946 manganese and, 453, 945

sanitation control, 946 North Western Railway, India; gravel wall wells, 1614

wall wells, 1614 Norwalk; Norwalk River pollution case, 1488 Nova Scotia; hydrometric investigations, 951 Nueces River; flow, 446 Nürnberg, Ger.; water supply, 1472

Oasis Cotton Co.; artesian well, 460 Ocean Falls, B. C.; swimming pool, 762

Odor; algae and, activated carbon and, 957 diatoms and, permanganate and,

see Chlorination, taste and odor; Taste and odor

Ohio; chlorination, extent employed, 457 Conference on Water Purification;

11th, 953
reports, decennial index, 959
consumption, rates and metering,

statistics, 959
Dept. of Health, activities, 457, 472
litration extent employed 457

filtration, extent employed, 457 pine and spruce trees adaptable to, 955 softening extent employed, 457

softening, extent employed, 457 streamflow drought and, 473 typhoid, 457 water, ground; 473

drought and, 1098 water supplies; drought and, 458, 472, 772, 1098

number and population served,
457
nublically and privately owned

publically and privately owned, proportion, 457 statistics, 473

see Books Ohio River; "river taste" and, 781 Oil; pollution; 600

American Engineering Council and, 588, 1616 see Boiler priming; Taste and odor

oil removal; skimmer, automatic, 2047

sodium aluminate and, 614 Oil well; brine disposal, 964 gas-lift method, 1616

waste reclamation plant, costs, 1239 water, sulfate-reducing bacteria in,

746
Oisterwijk; water supply, 2036
Oklahoma; ground water studies, 961
Missisppi flood control and, 961
stream-gaging and, 961

stream-gaging and, 961 waterworks short course; 6th, 959 7th, 963 Oklahoma City, Okla.; pipe line coating, 1085 pipe locator, 772 records and, 964

records and, 964
Olean, N. Y.; typhoid epidemic,
damage suits and costs, 783
Oligodynamic action; bibliography,

discovery of, 304 exhaustion and, 309 theory, 304, 309

water sterilization and, 935

see Copper; Katadyn; Silver; Sterilization

Omaha Metropolitan Utilities District; new service building, 1466 Ontario; Hydro-Electric Power Com-

mission, wood pipe, encasing in concrete, 581 hydrometric investigations, 950,

951 sanitation, 446

water supplies, data, 581, 1807

Ordinance; see Books Oregon; highway drinking water fountains, 920

Organic matter; chlorine dosage and, 302

fluorescence and, 1801 removal; activated carbon; filtration and, 312, 769

powdered, and, 1808 charcoal and, 907

see Boiler priming; Chlorine absorption; Oxygen consumed; Oxygen demand; Purification, self

Organic matter, determination; before and after centrifuging, value, 1261

dissolved, in sewage, 784
permanganate, hot, method, 907
see Chlorine absorption; Oxygen
consumed; Oxygen demand
Orifice meters; 586, 934

Ortho-; neglected for indexing

purposes Osaka, Japan; sewerage and, 596 water supply and, 596, 770 Oshkosh, Mich.; Aer-O-Mix and, 1494

Oslo, Norway; public baths, 2037 Ottawa, Ont.; electric sluice valves, large, 147

services, thawing, electric, cost and, 1241 Owyhee Dam; see United States

Bureau of Reclamation
Oxyacetylene; see Books; Welding
Oxygen consumed; chlorine absorp-

Oxygen consumed; chlorine absorption and, relationship, 304, 757, 906 high, instance of, 948 iron and, 758

Oxygen consumed, determination;

see Organic matter determination Oxygen demand; of sewage, per capita, 451

see Pollution, stream Oxygen demand, determination; dilution water and, 460 Pa

Pa

Pa

Pa

Pa

P

Pa

P

P

industrial wastes, calculation from 5-day result, inaccuracy and, 295 permolybdate, studies, 924, 1088

Oxygen dissolved; aeration and,448 algae and, 450, 451, 600 fish, minimum and, 452 nuisance and, minimum and, 452 photosynthesis and, 599, 753 reduction during flow through copper and wrought iron pipe, 947

copper and wrought iron pipe, 947 respiration and, 599 significance, 935

variations, diurnal, in pond waters, 599

see Boiler corrosion; Calcium carbonate; Corrosiveness; Filter, non-submerged; Filtration, slow sand; Iron corrosion; Lead; Microscopic organisms; Pipe corrosion; Pollution, stream; Purification, self; Railroad; Steel

Oxygen dissolved, determination; electrometric, 606 sampling and, 600, 1087 in sea water, micro method, 1468

Winkler method; 600 calculation, nomogram for, 165 sulfite and; 605

and organic matter, modification and, 2039

Oxygen removal; iron, steel, and oxide and, 307

Oyster beds; pollution, court decisions and, 1488 Ozone treatment; 459, 768, 1804

Pacific Gas and Electric Co.; butterfly valve tests, 444

Salt Springs Dam, construction, 447 Packing house; waste treatment, activated sludge, 935

Paint; arsenic in, water and, poisoning and, 786 minium, passifying action of, 910

minium, passifying action of, 910 rust-preventive; Arcanol, 1620 exposure tests, 918 hot water and steam resisting,

1620 iron oxide and, 1091 oil-free, 1620 tion; on per dilu-

rom 295 48

2 ugh 947 ers,

arter, low ad; orıri-

on:

ifi-XC ci-

ertin-

permeability determination, 910, 1091, 1802 pigments for, 909, 1474, 1620 red lead and, 1620

urface preparation and, 918, 1085, 1474 surface see Books; Pipe coating

Palmitic acid; preparation, 1089
Panama, C. Z.; settling basins, Chironomus and, 959 Paoli, Ind.; new filter plant, 784 Paper waste; oxygen demand of, 295

pollution, 784, 1097 see Sulfite

Paris, France; Laboratory of Hygiene, activated carbon filters, 1475, 1485 water supply; Loire Valley and, 1102

unfiltered, sterilization, 1102 see Books

measuring flume; Parshall Channel Parsippany-Troy Hills; cast iron

pipe, lined, 943 Pasadena, Cal.; rates, 295

services, charge for, 295 water; department, earnings in 1929, 295 gratuitous, 295

radioactivity, 1621 Peace River District, Alberta; geology and water resources, 1615

Pennsylvania; Delaware River di-version case, 751 laboratories, mobile, 618, 782 mine waste pollution, 1099

pollution control, 607 typhoid, drought and, 782 water supplies, drought and, 618,

Water Works Operators' Association, proceedings, 616 watersheds, reforestation, 925

Pennsylvania Railroad; conduit, jacking through fill, 315

Penstock; flow, measuring, water hammer method, 950 Peoria, Ill.; B. coli, per capita con-

tribution, 450 Peridinia; carbon dioxide and, 1801 seePermanganate; Chlorination, taste and odor; Manganese removal; Odor; Oxygen consumed; Taste and odor

Permutit, manganese; manganese deposition, organic compounds and, 1249

see Iron removal Perry, Okla.; ammonia-chlorine treatment, 964

Perth, W. Australia; corrosiveness, lime treatment and, 1620

Peru, Ind.; iron removal and soften-ing plant, 784

Peterborough, Ont.; emergency orization, 1464 fire hydrants, freezing prevention and thawing, 1240

services, thawing, 1241 Petersburg, Ind.; new filter plant, 784 Petersburg, Va.; filtration, early use of, 782

Phenol; carbon, activated, adsorption by, 1252

content, high, instance of, 1255 decomposition in water, natural, temperature and, 1090 removal; activated carbon filtra-

tion; 1255

regeneration, steam and, 1256 bank filtration and, 1086 diachlor-mutonite process, 1806 from effluents, aerated charcoal or soil filters, 1090 iron and lime and catalyst, 917

sand filtration, temperature and,

sewage and, 1090 waste, treatment, activated sludge and, 154 see Chlorination, taste; Cresol; Gas

and coke works; Taste and odor Phenol determination; in ammoniacal and waste liquors, 1802 Philadelphia, Pa.; Tri-State District,

regional planning and, 468

water quality, 906 Philadelphia Electric Co.; tunnel construction, 590

Phormium industry; water, hardness and iron content and, 1089

Phosphate; see Boiler corrosion; Boiler feed water treatment; Boiler foaming; Boiler priming; Boiler scale

Phosphate determination; in boiler practive; colorimetric; 1467 molybdate, silicic acid inter-

ference, 1467 sulfo-molybdate, 1259 precipitation, as phosphomolybdate, 1259

titrimetric, 1259 colorimetric, molybdate, 2039 Phosphoric acid; see Boiler feed water treatment; Boiler scale

Photosynthesis; see Carbon dioxide; Oxygen dissolved

Pigeons; access to water tank, B. coli and, 2038

see Reservoir Pipe; line; air-pockets, locating, water hammer method, 950 branches, locating, 293 cleaning, machine and, pits and, 1481 cost. 747 diameter, economical, determination, 749 electric currents, measuring, 1237 exposed, freezing of, 292 fracture, loss prevention, hy draulic cut-off valve and, 168 incrustation; iron bacteria and; lime treatment and, 166 scraping and recoating, 166 sodium silicate and, 166 iron in water and, 166 leakage; repair and, 315 water hammer eliminators and, 315 river crossing, 925 submerged; laying and cost, 317, sand removal, 145 suction, break at river crossing, typhoid epidemic and, 783 wyes, avoiding, advisability, 146 materials, metallurgy of, 749 sectional modulus, formula, 445 test section for studying deposits, etc., 766 see Aqueduct; Conduit; Main; Services; Siphon; Trenching Pipe, admiralty metal; capacity, permanence and, 947 hydraulic characteristics, 947 Pipe, brass; capacity, permanence and, 947 health and, 947 hydraulic characteristics, 947 Pipe, cast iron; 455 centrifugal; 455 failure, 949 manufacture, 301 coatings; bitumastic, centrifugal application, 157 bituminous; centrifugal applica-

flow coefficient and, 943 permanence, 943

centrifugal application, 157

Talbot, coefficient C and, 158

savings and, 943 cement; 611, 949

permanence, 455 specifications, 158

tion, 943

corrosion; ground water and, 914 hydrogen sulfide and, 934 tuberculation, carrying capacity and, 157 failure; causes, 949 cradling and, 583 foundations and, 949 friction coefficient, 599 joints; cement, 316 lead, calking, 316 Leadite, 943 materials, amount used, data, 941 line; bridge crossing, leakage and, centrifugal; 943 cost, 776 joints, Anthony, 778 leakage, specified, 318 river crossing, 1239 siphon, inverted, joint leakage and repair, 585 old, 765 sand spun; bursting strength, 455 manufacture, 454 small; long service and, 947 manufacture, 947 welding, bronze-, 154 see Electrolysis; Pipe, cement-lined; Pipe coating; Pipe cor-rosion; Pipe joint; Services; etc. Pipe, cement-asbestos; 168, 455 bursting strength, 455 manufacture, 613 Pipe, cement-lined; 466 alkalinity of water and, 1476 bacterial slime and, 1476 bitumen, dipping and, 455 deterioration, 146, 1476 flow coefficient, 943 permanence, 945 tuberculation prevention and, 146 see Corrosion; Pipe, cast iron; Pipe, steel; Pipe, wrought iron Pipe coating; 911 abrasion resistance, testing, 590 asphalt, abrasion resistance, 590 characteristics, ideal, 1085 exterior; aluminum paint, 167 bituminous, deterioration, 167 color, temperature of water and, 167 tar, deterioration, 167 hot-dipping, in field, 1085 tar, permanence, 945 tests in soils, 1084, 1085 see Calcium carbonate; Coating; Main; Pipe; Pipe, cast iron; Pipe, cement-lined; Pipe corro-sion; Pipe, steel

r

acity

, 941 and,

kage

55

entcoretc.

146 ipe,

7 nd,

ng; n;

Pipe, concrete; 953 friction coefficient, 599 Hume centrifugal, 455 line; 296, 607 submerged, joints, repair, 145 reinforced, cylindrically, 455, 607 see Conduit Pipe, copper; arsenic and, health and, capacity, permanence and, 947 copper in water and, health and, 935, 947 corrosion; 938 resistance to, 767 hydraulic characteristics, 947 oxygen dissolved, decrease in, 947 tinned; corrosion resistance, 767 health and, 935 welding of, 1237 see Copper; Services Pipe corrosion; 911 carrying capacity and, 469, 1620 galvanic currents and; dissimilar metals and, 1237 old and new pipe and, 1237 hydrogen sulfide and, 768 oxygen dissolved reduction and, 947 prevention, after cleaning, 753 protective rust coating and, 767 river crossing, lead and jute cover-ing and, 1084 rust removal, hydrochloric acid and inhibitor, 753 soil and; 1084, 1085, 1094 acidity and, 1085 protection, bibliography, 911 resistivity and, 1494 tuberculation; acidity and, 166, 1476 carbon dioxide removal and, 146 coating, pinholes in, and, 166, 1476 oxygen and, 166
see Calcium carbonate; Corrosivecass: Electrolysis; Iron corcast iron; Pipe, ness; Electrolysis; Iron corrosion; Pipe, cast iron; Pipe, cement-lined; Pipe, steel; Soil; etc. Pipe flow; bends; eddy losses, etc., reducing, 446 and elbows, resistance losses and, 1250 measurement; color cloud method, nomograph and, 582 pitot tube and, 946 salt-velocity method, 751

water hammer method, 950

see Pipe, steel

Pipe, galvanized; abrasion resistance, see Pipe, steel; Pipe, wrought iron Pipe, iron; Armco, welded, 317 welded, 445 see Iron; Pipe, cast iron; Pipe, wrought iron; etc. Pipe joint; hydrant branches and, 146 jute and, B. coli and, 773 lead substitutes, tapping sleeves and, breakage and, 146 materials, advantages and disadvantages of various, 1497 railway tracks and, 146 submarine lines and, 1497 see Pipe, cast iron; Pipe, sewer; Pipe, steel Pipe, lead; alloy, ternary, strength, compared with lead, 1476 corrosion; 767 in soil containing cinders, 934 see Lead; Services Pipe locator; 772
Pipe, sewer; infiltration, measurement of, 747
joints, 747 Pipe, steel; coating, external; asphal-tum and felt wrapping, 155 bituminous and jute wrapping, 168 concrete; circumferential increase and; 1246 asphalt cushion and, 1246 installations, list of, 1247 reinforcement and, 1246 thickness required, 1246 gunite and, 1246 wrapping and, 1478 corrosion; external, 167 pitting, 949 galvanized; capacity, decrease and, 947 hot water, corrosion and, 947 hydraulic characteristics, 947 joints, welded; 455 and riveted, strength and, 1470 spirally-, 748 line; 296, 953 cost, 592 diameter, economical, determination, 749 friction loss, formula, 750 leakage, 749 new, 765 river crossings, 765 riveted, spirally-, rupture, earth-quake and, 1238 submerged, repair, air-lock and,

welded; construction, 154 electrically-, construction, 775, 776

lining; bitumen, spun, 1476 cement; adhesion, securing, nibs and, 168

application, centrifugal, 168 bitumen preparatory lining and, 168

permanence, 455 small; capacity, decrease and, 947 hot water, tuberculation and, 947 hydraulic characteristics, 947

see Calcium carbonate; Corrosion; Corrosiveness; Electrolysis; Iron corrosion; Pipe; Pipe, cement-lined; Pipe coating; Pipe corrosion; Soil; Steel; etc.

Pipe, wood; slime, nature of, 1476 -stave line; 598, 1239 encasing in concrete, 581 Protexol paint and, 1239 reconstruction, 775

wrought iron; cement-lined, early use of, 949 galvanized; capacity, decrease and,

947 hot water, corrosion and, 947 hydraulic characteristics, 947

small; capacity, decrease and, 947 hot water, tuberculation and, 947 hydraulic characteristics, 947 oxygen dissolved reduction and, 947

see Corrosion; Corrosiveness; Electrolysis; Pipe; Pipe coating; Pipe corrosion; Services; Soil; etc.

Pitometer; 586, 934 see Leakage

Pitot tube; see Pipe flow Pittsburgh, Pa.; alkalinity decrease,

consumption, 156 emergency organization, 1464 pumping station, new, and cost, 448 typhoid and, 157

waste surveys, 157 water supply system and value, 156 Pittsfield, Mass.; pipe plug, 582 Plankton; see Microscopic organisms Planorbis; see Snail

Platte City, Mo.; new supply, iron removal and, 314

Plumbing; corrosion, dissimilar met-als and, 1103

fixtures; leakage, frequency, 153 staining; iron and, 466 manganese and, 467, 1252 regulations, state, 929 see Hot water system; Tap

Plumbo-solvency; see Lead Poland; sanitary engineering in, 597 Pollution; 621, 790, 1262 seq. age of, determination, Clemesha's

method, 604 control, 600, 783, 791, 922 court decisions and, 1095

indicators; B. welchii and other sulfite-reducing bacteria, 938 chlorine absorbed-chlorine concentration diagrams and, 1254

P

P

P

fluorescence, 1801 glucose and lactose titers, difference and, 604

lactose-fermenting bacteria, rate of disappearance and, 604 oxygen consumed and chlorine number relationship, 757, 906

Ps. pyocyanea, 1097 investigations, dissolved oxygen determinations, importance, 935 prevalence, 1265

sewage; discharge of raw, prohibition of in Indiana, 791 pump connected to main for priming and, 782

vessels, ballast water discharge and, 1097

water supply and, limits, 452 see Water, ground; Watershed; Wells

Pollution, industrial wastes; 600, 621, control, cooperation and, 951, 1104 regulations, France and, 2045

see Fish; Mine; Paper; Sugar; Sulfite; etc.

Pollution, stream; 322 bacteria, maximum number, point of, 1094

Bacterium coli; per capita, 450 maximum number, point of, 450 tributary streams, increase below, 450

control; 594, 1094, 1265 Federal Government and, 792 law and, 313 river boards and, 927, 931, 935, 1093, 1482 sanitary districts and, 2044

state and, 792 court decisions re, 1096, 1488

in Illinois, 2043 intestinal disorders following sterilization, 451

investigation, 452 limits, permissible, 452

nuisance, oxygen dissolved, minimum and, 452

oxygen demand, sludge deposits and, 451

97

ha's

sul-

on-

1254

ffer-

rate

rine

gen 935

mo-

for

rge

ed;

321,

104

ul-

int

be-

35,

ri-

ıi-

)6

reaeration; algae and, 451 atmospheric, rate and factors,

stream classification and, 594, 607,

see Brandy Wine Creek; Fish; Purification, self

Ponca City, Okla.; Diesel engine, economy and, 960

Pontianak; color removal studies,

Port Arthur, S. Manchuria; water supply, 1613 Portland, Me.; submarine pipe, lay-ing and cost, 317, 946

Portland Cement Association; pipe,

concrete coating, tests, 1246 Portsmouth, O.; taste, activated carbon and, 957

Potassium determination; small amounts and, 463, 910, 1470

see Alkali Potassium hydroxide; see Boiler feed water treatment

Potassium permanganate; see Permanganate

Potomac River; flow, bends and, 593 see Upper Potomac

Power; see Electric; Hydro-electric Pressure; fire protection and, 780

low, contamination of system and, 591 Preston, Eng.; consumption, 455

reservoir, new, 455, 1102 Prettyboy Dam; see Baltimore, Md. Prince Edward Island, Can.; hydrometric investigations, 951

Princeton, Ill.; water works, financial data, 458 Property; condemned, damages and,

law and, 454 Protococcus; chlorination and, 778, 779

copper sulfate and, 778 Protozoa; B. typhosum and V. cholerae, longevity and, 1806

carbon dioxide, hydrogen sulfide and oxygen and, 906 self-purification and, 785 water-borne disease and, 1475

see Bodo saltans Provo City, Utah; reservoir, new, and

cost, 446 Pseudomonas pyocyanea; in water, significance, 1097

Public; relations; improving, 964 water companies and, 964 waterworks man and, 618

Pulaski, Va.; taste and odor, microorganisms and, chlorination and, 1464

Pump discharge-head relations, mathematics of, 959

drive; Diesel; economy and, 458,

fuel costs, 164 installations, 164, 960 electric; 960

starting torque, 960 testing, 317

efficiency; determination, 469 increasing, 469 piston; operating conditions, varia-

tions and, 165 steam consumption, 165

wide use in Germany, 165 suction leakage, air-binding of filters and, 450

see Railroad; Well Pump, 1478 centrifugal; drive; Diesel,

electric; 445, 598, 960, 1478 control, automatic, 1250

discharge, measuring, 787 efficiency, calculating, 787 starting torque and, 960 steam, 942, 1102

efficiency; determining, 1495 operating conditions, variations and, 165

emergency unit, rapid installation of, 292

operation, 321 performance, factors, 787

reservoir, impounding and; float and, and advantages, 169 inclined hoist and, 169

selection, 321 stage variations, hoist-operated car and, 775

trend toward, 1264 see Well

Pumping engine; new, 157 vertical triple-expansion, 942, 1251

Pumping station; 944, 1250 booster, new, 156 capacity, fire protection and, 780

discharge header; design, 445, 1480 expansion joints and, 1480 drive; Diesel, noise elimination, 771

electric; savings and, 786 standby, Die and, 445, 1240 Diesel-generator

vs. steam; costs, 449 vs. Diesel, costs, 770 standby, gasoline engine, 786

steam, coal consumption per unit output, 1478

new, 448, 776, 921, 932, 1095, 1240 piping, co and, 1481 condensation, wrapping portable, 765 pressure, high, new, 943 sewage, 472 see Electric motor; Engine, Diesel; Railroad; Well Purcell, Okla.; Diesel engine, economy and, 961 Purdue University; triangular weir, calibration, 297
Purification; 160, 306, 458, 461, 464, 472, 620, 787, 921, 1096
control, laboratory, 471, 792, 1264 cost, 292, 608 developments; 456, 588, 1251, 2045 research and, 148 health and, 1255 industrial supplies and, 1496 infant mortality and, 1255 plant; 944 design, 1096 new, 774 vs. pure source, 1496 records, value, 1486 report forms, 1486 typhoid and, 1097, 1255, 2042 see Aëration; Books; Chlorination; Electroösmosis; Filtration; Freezing; Iron removal; Lime treat-ment; Norit; Softening; Sterilization; Storage; Treatment; etc. Purification, self; factors, 451, 613 high water and, 450 organic matter oxidation, factors, 451 protozoa and, 785, 1806 sewage oxidation, temperature and, 451 of streams; 935 artificial lakes and, 314, 1093 oxygen balance and, 1094 rate; pollution intensity and, 451, 613 stream size and, 451

recording, 1095

Quebec City; reservoir, proposed, 1102

Quebec Province; hydrometric investigations, 950

Quincy, Ill.; softening plants, 1101

time of flow and, 1094

temperature and, 1090 Purite; see Corrosiveness

Pyrometer; 1470

Quincy, Ill.; softening plants, 1101 Quincy, Mass.; east iron pipe failure, Racine, Wis.; intake, 149
water works extension, 944
Radioactivity; 1237
Stone Mountain springs and, 1468, 1614
of waters, soils, etc., in Southern

California, 1620 Rahway, N. J.; taste treatments, 947 Railroad; boiler; blow-down, con-

tinuous, 2048 corrosion and pitting; pH and dissolved oxygen and, 2046

zeolite treatment and, 316
feed water treatment; chemical
feed and, 317, 2046
coagulants, comparison, 2046
economy and, 1089
vs. internal treatment, 938
Lassen-Hiort, 311

Lassen-Hjort, 311 lime-soda; 1089 cost, 1089 -sodium aluminate, 317,

savings and, 316
sodium aluminate and, 2047
softening, economies and, 938
zeolite; plant cost, 316

savings and, 316 foaming, blow-down and, 2046 grates, "Alumet" coating and, 912

hardness, maximum for untreated supplies, 2046 wash out storage, concrete tanks

and, 2047 water; cars, savings and, 316 cold weather and, 2047 columns, 2047

drought and, 316, 317, 2045, 2048 hose, 452 hydrants, 452

meters, testing, 315 pails, 452

pump, valve and packing specifications, 2046

pumping; oil engines and, 2047 plants, automatic, 316, 317 service, pipe fittings, emergency stock, 315

tanks, winter operation, 2048 see Boiler; Softening

Rainfall; 936
Arizona, 1614
bibliography, 1079
Boston, 1080
California, Southern, 777, 1613
drought; cause, 299, 774
in far west, 1929, 145
prediction, 1079

water supplies and, 935, 1087 of 1930; 748 ground water and, 299, 465, 472, 774, 1092, 1096, 1098, 2045 Illinois and, 748 Indiana and, 748, 781 Kentucky and, 772, 1098 lessons from, 1242 Maryland and, 468, 772, 1098, 1103 Missouri and, 748, 1092 New England and, 1483 North Carolina and, 449, 1098 Ohio and, 458, 472, 772, 1098 Pennsylvania and, 618, 772 railroads and, 316, 317, 2045, 2048 streamflow and, 299, 449, 465, 473, 2045 sun spots and, 774 typhoid and, 465, 748, 782 Virginia and, 772 water supplies and; 458, 465, 472, 608, 618, 748, 765, 771, 774, 781, 931, 944, 1092, 1098, 1103, 1237, 1466, 1483, 1492, 1493 intestinal diseases and, 465 West Virginia and, 465, 772, 1098 duration-intensity formula, 1080 measurement, 610 percolation, terracing and, 961 prediction, accuracy, 774 recording, procedure, 449 runoff and; 777, 1613 soil and, 1079 sun spots and, 1079 world data, 1079 see Books; Stream; Water, ground; Well Rand Water Board; report, 1930-1, 953 Rangoon, India; chlorination, aftergrowths and, 919 Ps. pyocyanea as pollution indicator, 1097 water supply, 591 Rariton River; sanitary survey, 783 Rates; Atlantic City, 950 bulk, 589, 1099 Chicago, 292 city limits and, 772 Cuba, 462 East Bay Municipal Utility District, establishing, 772

graduated scale, 291

18,

rn

n-

8-

al

46

17

l,

-

8

8

Huntingburg, Ind., 1248 minimum, 295 municipality, size and, 959 Ohio, 959 outside communities and, 147, 291 Pasadena, 295 public use and, 772 service charge, 593, 772, 1248 sprinkler systems and, 772, 941, 1249 statistics, 1249
see Books; Consumption; Fire protection; Valuation Rayon; manufacture, water purification and, 1486 waste treatment, 1090 see Textile Records; importance, 964
see Chlorination; Distribution system; Purification Red water; causes and correction, 466 prevention, 753 see Corrosiveness Regina, Sask.; consumption, 755 water supply; extension, reports, 448, 755 investigation, 1241 Requena Dam; cellular core wall, 745 Reservoir; bank protection, pine trees and, 955 concrete; 613, 765 construction, 776 covered, record size, 1080 covering, cost, 778 distribution; 780 with chloride of chlorination, lime and HTH, in burlap bags, concrete; covered, new and cost, 446, 1466, 1474 waterproofing, 446 covering, microorganisms and, 779 embankment, masonry-lined, design, 608 fencing, 611, 1100 open, bacterial growths and, 318, 787, 928 tadpoles, "frog fence" and, 787 elevation gauge, inexpensive, 601 embankment repair, 1475 filtered water, cost, 747 gulls; B. coli and, 948, 1251 shooting, 611, 948 wiring and, 1251, 1619 ice accumulations and, 1082 impounding; 299 construction, 307 cost, 295, 455

evaporation; determination, 1103 formulas, 1081, 1103 insolation and, 1081 loss, 600 leakage; 777

fault grouting and, 166 manganese and; 453 stripping and, 1256

microörganisms, chlorination, boat and, 778 new, 455, 457 organic matter and, 599 outlet works, 296, 307 pumping from, 168

recreational use, prohibition of, 1464

silting; 447, 927, 1081 prevention, 1081 sites, and clearing of, 927 lining with gunite, cost, 747 new, 783, 1102

open, sludge in, 958 pigeons and, 948

pond lilies, copper sulfate and, 616 safety provision Act, Gt. Britain, 1250, 1482

snail shells and, 958

steel, record size, 151 worms, red (Chironomus), cover-ing and, 958

see Books; Copper sulfate; Evaporation; Flood; Hydro-electric plant; Mosquito; Standpipe; Storage; Tank; Watershed Revere, Mass.; cast iron pipe failures,

Rhode Island; Board of Purification

of Waters, powers and duties, 922 pollution control, 922 and Providence Plantations, Bd. of

Purification of Waters, report,

swimming pool supervision, 761 Richfield Springs, Tex.; typhoid epidemic, damage claims and, 152 Richmond, Va.; aeration, 782 consumption, 784

Eastern Hospital for Insane, stand-

pipe, 151 purification problems, 784 sand washing machine, 928

Rio Grande River; see Middle Rio Grande Conservancy District Rio de Janeiro; enteric fever out-

break, 463

Roanoke, Va.; aeration, 782 Rochester and Lake Ontario Water Service Corporation; new steel reservoir, 151

Rock; geophysical exploration, 580 resistivity, theory, 580
see Dam; Geophysical exploration
Rodriquez Dam; construction, 583 Rose Creek; flow, diurnal variations, 592

Sa

Sa

S

S

Se

Se

S

S

SE

S

S

SE

Si

S

S

S

S

S

Roseville, Mich.; distribution system, new, and cost, 147 metering, 147

supply main, meter and, 445 Roswell, N. M.; artesian well, large flow and, 150, 460

Rotifera; carbon dioxide, hydrogen sulfide and oxygen and, 906 Rotterdam, Holland; chlorination, 1257

Rowett Research Institute; goiter. iodine and, study, 168 Ruhr, Ger.; River, lakes project; 933

pollution and, 314 -verband, activated carbon filtra-tion, 309, 312

water-sewage-water cycle, 1245 see Books

Run-off; bibliography, 1079 estimating; formulas, 1809 minimum and, 1242 forestation and, 928 rainfall and; 777, 1613 soil and, 1079

variations, 774 see Books; Snow

Sacramento, Cal.; consumption, 778 metering, 777 purification plant extension, 775, 777 sedimentation basin, report on, 746 taste, 778 water quality, 778

Saginaw, Mich.; new softening and filter plant, 444 Saigon-Cholon, Cochinchina; chlori-

nation, 594 Saint Catharines, Ont.; consumption, 756

purification plant data, 756 Saint David, Ariz.; mottled tooth enamel, 475

Saint Joseph, Mo.; purification plant, 601

Saint Louis, Mo.; consumption, 153 emergency organization, 1464 filter sand, craters and, 1244 Howard Bend plant, 600

metering, selective, waste elimination, and, 153

purification cost, 608 River des Peres drainage channel project and cost, 301

Saint Paul, Minn.; elevated tank, new and cost, 151

Saint Petersburg, Fla., water supply, new, 443, 764 wells, salting, 443

n

ion

ns,

ys-

rge

gen

on,

ter,

933

ra-

746

nd

ri-

n,

th

nt,

a-

nel

Salem; cast iron siphon, repair, 585 Salem, N. H.; Diesel engine drive, 164 Salinity; see Mineral content; Water, ground Salt Lake City, Utah; swimming

pools, 318

water supply, new, proposed, 442 Salt Springs Dam; see Pacific Gas and Electric Co.

Salta, Argentine; goiter, iodine in water, food, etc., and, 912

Saluda Dam; mosquito control, 298 Sampling; 600, 771, 919

apparatus, 1253 of marine muds, 918

for suspended sediment, 592

see Oxygen dissolved, determination

San Antonia, Tex.; consumption, 942 pumping stations, 942

San Diego, Cal.; Otay pipeline, construction, 154

San Francisco, Cal.; Calaveras tunnel explosion, 294

Hetch Hetchy tunnel construction, 589

Moccasin Dam, construction, 608 steel pipe line; bids, 592

construction, 775, 776 water supply, emergency, from East Bay Cities, 589, 776

San Jose, Cal.; new reservoir, 776 San Juan River; suspended matter and, 583

Sand; see Filter sand

Sandusky, O.; odor, activated carbon and, 957 softening plant, 956

Santa Barbara, Cal.; outfall sewer repair, 145

Santa Cruz; pipeline, deLavaud, 776 water works, 776

Santa Fe Springs Waste Disposal Co.; oil reclamation plant, and operating costs, 1239

Santiago de Cuba; dam site borings,

water supply, proposed, 1251 Sao Paulo, Brazil; water supply, 757 Saskatchewan, Can.; hydrometric investigations, 951

southern, water supply problem, Schistosomiasis; in Egypt, 595

snails and, 595 in Sudan, 595

School supplies; Clark County, Ind., and, 781 Illinois and, 780

Schuylkill River; alkalinity decrease,

pollution survey, 607 Scotia, N. Y.; water water supply improvements, 944

Scotland; goiter, iodine and, 937 Rivers Pollution Committee, report,

Screen; 612 traveling, 444, 943 see Intake

Sea gull; see Gull Sea water; alkaline reserve of, 758

carbon dioxide; -carbonate equilibrium, 753 and oxygen, photosynthesis and,

753 chloride determination, 1800

H-ion concentration determination. quinhydrone electrode and, 1236 compounds, determinanitrogen tion, 1802

purification by freezing, 307 specific gravity; 443

determination, 1800 sulfite waste detection, 2039

see Books; Brine; Swimming pool; Water, ground; Well Sediment; determination, biological

sieve and, 757

Sedimentation; 144, 916, 920, 925 basin; design, 1086

flow, eddies and, 764 mechanical thickeners and, 2043 shallow, 778 sludge; deodorization, activated

carbon and, 1808

removal, continuous, 1096 coagulant dosage required and, 2043 see Coagulation basin

Sellersburg, Ind.; new water supply,

Services; 949

cast iron vs. wrought iron, 1804 charge for, 295

copper; 776

corrosion resistance, 1497 vs. lead, 146

corrosion, dissimilar metals and, 1103

flow, stopping, plug for, 582 installation, regulations, 1249

suction created in by main velocity, 591

thawing; 949 electric, gasoline engine-driven machine and transformer methods, and costs, 1241

worms in, 616 see Corrosion; Curb cock; Lead; Pipe; etc. Sewage: bacteriophage, chlorination and, 754 B. paratyphosum and; 1618 isolation, 931 B. typhosum and; 786 isolation, 931 discharge; court decisions re, path, observing, dye and, 1484 of raw, prohibition of in Indiana, 791 into sea, legality, 1488 omestic, toxic chemical domestic, toxic chemical stances, freedom from, 451 oxygen demand, per capita, 451 phenol and, 1090 treatment; 1107, 1265 activated sludge; 161, 313, 472, 935, 963 bacterial removal, 1263 cost, 1263 phenol waste treatment and, horizontal partition aeration. and, 936 B. typhosum, survival and, 939 chlorination; chloramine forma-tion and, 1247 copper and, 1104 lime and, 1104, 1247, 1809 data, obtaining and filing, 1809 developments, 607, 1497 filtering medium, sodium sulfate soundness test, 771 Imhoff tanks, foaming, 472 Laughlin process, 1809 plant; 788 new, starting, 788

reclamation; 923, 1245, 1256, 2045 cost, 296, 923 requirements, 472 securing, difficulties and, 963 septic tanks, 2048 sludge digestion; 161, 935, 1107, 1497 softening sludge disposal and 772, 1108, 1109 softening sludge disposal and, 1108, 1109 water supply and, 322, 790

see Books; Chlorination; Chlorine absorption; Feces; Pollution, stream; Purification, self; Water supply

Sewer; installation, 1497 see Pipe, sewer

practice, 1809

Shanghai, China; International Set-tlement; consumption, 1477 metering, 1478 water purification plant extensions, 1477 water supply, 1102 Shawinigan Water and Power Co.;

S

S

S

S

Toro Dam construction, 741 Sheboygan, Wis.; consumption, lawn sprinkling and, 1240 Sheffield, Eng.; Ewden Valley reservoirs and filter plant, 307

water supply and purification data. 161

Shellfish; see Oyster Shimzu tunnel; see Japan Shreveport, La.; water works extension, 942 Shrewsbury, Eng.; water supply, 1102 Siam; civil engineering in, 1464 water supply conditions, 942 Sieve; analysis, variable factors, 1802 see Filter sand

Silica; determination; 303 dehydration temperature, 1083 form of in water, 908 removal, sodium aluminate and, 461, 614

therapeutic action, 908 see Boiler corrosion; Boiler feed water treatment; Boiler scale

Silicic acid; determination, 1083, 1622 removal, 302 see Boiler scale Silk; see Textile Silver; algae and, 309

-clay filter, 2041 detection, rhodanine and, 1237 dissolved from plane surface, estimating, 309

glass, adsorption by, 309 as a poison, 1103 sand impregnated with for filtration; 168, 1479

sand preparation and, 1479 -treated water, bactericidal power, boiling and, 2041 water sterilization and; 754, 1235

B. coli and, 1235 see Chlorination; Katadyn; Oligodynamic; Sterilization; Swim-

ming pool Silver nitrate; oligodynamic action, 309

Singapore; Fort Canning reservoir, construction and cost, 1474 water supply and treatment, 596, 1102, 1241 Sioux Falls, S. D.; Diesel engine,

economy and, 960

Siphon; collapse and restoration, 448 inverted, design, 297 Snail; schistosomiasis and, 595 shells in open reservoir, 958 Snow; survey, procedure, 582 Soap; hard water loss, 473 softening, saving and, 1488, 2042 water used with, percentage, 2042 Soda ash; see Boiler feed water treatment; Boiler scale; Dam, earth; Hydrogen-ion concentration; Manganese removal; Railroad; Softening Sodium; determination, volumetric, see Alkali; Mineral content Sodium aluminate; see Boiler feed water treatment; Boiler foaming; Boiler scale; Boiler water; Coagulation; Color removal; Oil removal; Railroad; Silica; Softening Sodium bisulfite; see Dechlorination Sodium carbonate; see Boiler feed water treatment; Boiler scale; Corrosiveness; Dam, earth; Purite; Railroad; Softening Sodium chloride; for zeolite regeneration, specifications, 2046 see Chloride Sodium hydroxide; see Boiler feed treatment; Hydrogen-ion water concentration; Softening Sodium hypochlorite; bactericidal action, radiation and, 915 solutions, corrosiveness and deterioration, admixtures and, 1236 see Hypochlorite Sodium peroxide; water sterilization and, 916 Sodium phosphate; preparation, in boiler room, 1259 see Phosphate Sodium silicate; see Laundry; Pipe; Softening Sodium sulfate; see Boiler corrosion Sodium thiosulfate; see Chlorination, taste and odor; Dechlorination Softening; 448, 458, 472 apparatus, 301 barium aluminate and, 914 barium fluoride and, 303 base exchange; 303, 313, 322, 456, 472 advantages, 458 aluminum salts and, 614 apparatus, portable, 159 bacteria and, 935

copper removal, 935, 1102

cost, 159, 322, 962, 1093

Set.

cten-

Co.;

awn

eser-

ata,

ten.

1102

1802

33

ınd,

eed

622

sti-

ra-

er,

li-

m-

n,

ir,

96,

ıe,

Crystalite and; 1093 carbon dioxide and, 1107 deterioration, 1107 exchange value, 1107 iron and, 1107 regeneration, 1107 down- vs. up-flow, 962 employment, increase and, 466 filtration rate, 584 greensand and; 962 iron release and, 962 history, 159 household, cost, 473 iron and, 962 lead removal and, 935, 1102 lignite and, 303 vs. lime-soda, 962 manganese salts and, 615 media; loosening, 310 natural and synthetic, 962 preparation, 302, 305, 310 plant; cost, 1093 new, 584, 962 pressure vs. gravity, 1093 regeneration; control, pH and, salt; consumption, 962 specifications, 2046 sea water and, 1102 two-stage, 936 sand in water and, 316 tin salts, removal, 1102 wash rate, 584 zinc removal, 935, 1102 cost; 458, 472 comparison of methods, 293, 472 public vs. private, 472 economy of, 458 education of public re, 294 extent employed; 294, 457, 782 increase and, 2043 fundamentals of, 2043 lime; 2043 clarifier and, 958, 1101 hardness, residual and, 310 vs. lime-soda, cost and, 931 and recarbonation, 293, 588, 772, 956, 1109 -soda; 775 and recarbonation; 1808 limit, theoretical, 293 mixing period, 1101 plant, 1101 quicklime and, 958, 1808 recarbonation, double, 466, 958 sand deposits and, 755 settling period, 1101

slaking, use of caustic water for. road; Soap; Textile; Water, ground; Zeolite Soil; B. coli; -B. aerogenes ratio, 153 sludge return and, 466 -soda; 303, 322, 472, 618, 757, 957, 2043 -like bacteria in, 1471 virgin soil, absence and, 1480 alum and, 1487, 1808 corrosiveness; index of; acidity and, clarifier and, 618, 956, 1808 169 color removal and, 2042 hydrogen, exchangeable, and, cost, 322, 1487, 2042 169 pH and, 169 feed lines; cleaning, 959 fire hose and, 959 test, accelerated, 169 incrustation, reducing, moisture, 936 959 sandy, temperature data, 1615 see Lead; Pipe corrosion; Pipe, magnesium-containing waters and, 159 lead; Runoff magnesium removal, sodium Solids, determination; in boiler water, aluminate and, 613 hydrometer and, 2048 in brine, 2040 main incrustation and, 156 mixing period, 444 drying temperature, 604 plant; new, 444, 956, 1487 South Bend, Ind.; consumption, 586 pipes, accessibility for metering, 586 cleaning, 953 well development by siphons, 586 South Pittsburgh, Pa.; taste and settling period, 1487 silica removal, sodium alumiodor, activated carbon and, 956, nate and, 614 sludge return and, 456 South Pittsburgh Water Co.; softening, 618 South Platte River; flow, 580 sodium aluminate and, savings and, 613 -zeolite; 303, 456, 472, 962, 963, 1093, 2043 Southeastern Section; Journal, 321, 1808 cost, 1093 Southend, Eng.; activated carbon addition, 312 Southern California Edison Co.; non-carbonate hardness content and, 293 plant; cost, 958 Venturi meters, calibration, 750 new, 957 Southern Pacific Railroad; septic municipal, hardness, residual and, 584, 956, 958, 962, 1487, 1809 tanks, 2048 zeolite treatment, economies and, plants; 944 new, 784 in U. S., number and type, 293 316 Spa; see Spring Spartanburg, S. C.; swimming pool, sludge; amount produced, 772, 956, 1108, 1109 1809 water supply, 1809 calcining, impracticability, 1108 Spirogyra; taste and odor, chlorinedeodorization, activated carbon ammonia and, 963 and, 1808 Spirophylla; pH and, 166, 1476 disposal; with sewage, 1108, 1109 see Bacteria, iron Spring; Aikawa, S. Manchuria, and, sewage sludge digestion and, 772, 1108, 1109 1614 drying, 1108

use, as substitute for agricultural

sodium hydroxide and sodium al-

taste and, activated carbon and,

see Boiler feed water treatment; Brewing; Hardness; Lime treat-

ment; Manganese removal; Rail-

lime, 956

1495

uminate, 939 sodium silicate and, 910 arsenic and, 1616
Dürkheim, Bavaria, and, 1615
mineral, 763
silica-containing, 908
Stone-Mountain, Ga., radioactivity and, 1468, 1614
typhoid epidemic and, 152
Virginia and, 1613
see Water, ground
Springdale, Pa.; zeolite softening
plant, 584

S

S

S

S

S

Springfield, Ill.; lime sterilization, pre-ammoniation, 468 softening and recarbonation, 755 Springfield, Mass.; Cobble Mountain project, power development, in-take changes, 299, 300 concrete reservoir extension, contract bids, 1466 Springfield, Mo.; meter testing, 469 Sprinkler system; rates for, 772 service charge, legality, 941 Standpipe; 944 steel; enclosure in masonry, cost and, 150, 151 new, 156 see storage; Tank Steam plant; efficiency, 961 see Boiler Steel; see Pipe; Reservoir; Standpipe; Tank Steel corrosion; carbon content and, coatings, value, 313 composition and, 313 copper addition and, 313, 1621 covering with aluminum foil and, 1085 oxide films and, 313 oxygen dissolved and, 1469 painting, sand blasting and, 1085 protection; 1622 chromates and, 1254 rate, oxygen dissolved and flow velocity and, 315 see Boiler corrosion; Corrosion; Corrosiveness; Iron corrosion; Pipe corrosion; Pipe, steel; Railroad; Soil Sterilization; cost, 915 metals and; adaptation of bacteria to, 754 salts and, colloids and, 754

d,

r,

d

6,

n

ic

ł,

see Chlorination; Copper; Disinfection; Iodine; Katadyn; Lime treatment; Oligodynamic; Ozone; Silver; Sodium peroxide; Ultraviolet

Stone Mountain, Ga.; springs, radioactivity, 1468, 1614

Storage; elevated; 780
fire protection and, 1096
fire protection requirements, 780
purification and, 165, 447, 473, 604, 757, 916, 926, 927, 1478, 1618
see Reservoir; Standpipe; Tank

Stream; chlorination, 611
control, Federal Government and, 931

ultra-filtration and, 768

diversion, automatic siphon spillways and, 766 erosion, bends and bridge piers and, flow; 936 bends and; 446, 582, 593 surface elevation variations and, 593 diurnal variations, 592 drought and, 299, 449, 465, 473. gaging; 927, 934 cable and car, 588 N. Carolina and, 449 Oklahoma and, 961 value of, 1250 ground water and, 449, 1242 model observations, permanganate and, 582 prediction, 459 records, value, 1809 transpiration and, 592 watershed cover and, 468 impounded, safe yield and, 1242 see Current meter; Pollution; Purification, self; Run-off Streptococci; enumeration, 473 see Swimming pool Stuttgart, Ger.; ac filtration; 312, 1255 cost, 312 activated carbon chlorination, A. D. M. process, 1254, 1255 water treatment, health and, 1255 Sudan; schistosomiasis and, 595 Sugar, beet; wash water, reuse, 594 waste; oxygen demand and, 295 pollution, deoxygenation and, fish and, 785 treatment; 313, 935, 1102, 1472 biological; 594 filters, 1102 see Books Sulfate; reduction by bacteria in oilwell waters, 746 Sulfate determination; colorimetric, barium chromate, 1621 volumetric; 612 barium chromate, 1254 rhodizonate, 1805 Sulfite; filter sand incrustation and, oxidation in streams, rate, 605

oxygen determination and, 605,

waste, detection in sea water, 2039

Sulfuric acid treatment; see Boiler

Sulfur dioxide; see Dechlorination

Sunlight; see Bacteria

2039

scale

Suspended matter; sampling for, 592 see Turbidity Sweden; goiter, iodine and, 912 rivers, flow of, 605 Swift River; see Boston Swimming pool; 931 aeration and, 306, 762, 1251 chlorination; 306, 761, 762, 1251, 1483, 2036, 2037 ammonia and; 930 algae and, 617 copper and, 1089 residual and; 319, 594, 917 B. coli and streptococci and, 594, 917 sea water, bromine liberation and, 312 silver and, 1089 coagulation and; 762 alum and; 762, 1483 vs. ammonium alum, algae and, 318 aluminoferric and ammonia, 306 construction, 776 copper sulfate treatment and, 318 cost, 761 cross-connections, prevention and regulations re, 593 design, 460, 762, 1483 filtration; 1483, 2036 breakdowns, causes, 762 control, automatic alarm and, 318 inspections and, 762 pressure, 306, 761, 762, 1484 rapid sand, 761, 762, 1251 financing, 963 new, 154, 1484, 2036, 2037 operation, 460, 1483 recirculation period, 154, 306, 761, 762, 1483 regulations and supervision; city, 761, 763, 1089, 1483 state, 761, 762 sanitation, 446, 963 steel, arc-welded, 297 suction sweeper and, 762, 1484 water; bacterial content, reducing, 763 bacteriological examination; frequency, 917 methods, 763 blood agar count, 1089 purification; 460, 935, 1095 activated carbon and, 1256 quality; criterion of; B. coli and, 594, 917 micrococci and, 594, 918 streptococci and, 594, 918 factors, 1095

sea, and, 2037 at water works, 1809 Sydney, N. S. W.; Nepean dam, 745 pipe investigations, 168 water supply, 745, 923 Sylvan Dam; see Melbourne Synura; copper sulfate and, 770 fishy taste and, permanganate and, 948 Syracuse, N. Y.; reservoir, gunitelining costs, 747 Tabellaria; chlorination taste and, taste, permanganate and, 1618 Tacoma, Wash.; wood-stave pipeline, reconstruction, 775 Tadpoles; in reservoir, "frog fence" and, 787 Taikam Island, S. China; asylum, typhoid epidemic, 1095 Tampa, Fla; ammonia-chlorine treatment and cost, 163 coagulation, alum and acid, 163 Tank; concrete, circular, design, 747 developments, 2044 elevated; concrete, and cost, 150 new, 782, 783 radial cone bottom, 2044 steel; enclosure in masonry, cost and, 151 erection over standpipe, 150 large, 591 overflow, elevation, determining, 156 pigeons and, B. coli and, 2038 steel, cost, 747 wash water, elevation gauge, in-expensive, 601 see Books; Reservoir; Standpipe Tannery; waste treatment, 607 Tap; leather washers, leather bacillus and, 1619 Taste and odor; 608, 621, 941 aeration and, 607, 929, 944, 948, 1495, 1806 carbon, activated, and; 473, 781, 944, 1495, 1618 cost, 473 filtration; 312, 948, 1252, 2043 regeneration, frequency and, steaming and, 312 powdered, addition; 782, 1252, application, point of, 1492, 1493 carbon recovery, 1804 cost, 957 dosage, 609, 956, 957, 1238,

1492

957, 1494, 1495 pre-, 944, 957 earthy; 618 1806

ost 150ng, in-

45

nate

nite-

and,

ine,

ce"

um,

eat-

747

lus 48,

81,

ıd, 52,

2,

8,

filters, slow sand, loss of head and, 312 installations, number of, 461 chloride content and, 1246 chlorination and; ammonia and,

super-; 944, 948, 1487, 1495 and activated carbon, 2 312, 948, 1238, 1475, 2043 292, coagulation and, 1495

dead ends and, 949 detection, distillation test, 956 determination, 920, 1492 distillery waste and, 948

actinomyces and, 940 activated carbon filtration and addition and, 940 filters, idle, washing prior to use

and, 1495 lime, excess, and, 781

microörganisms and; 471, 964, 1465 aeration and, 770, 1806 carbon activated; filtration and,

powdered, addition, and; 1808 application, point of, 1493

cost, 788, 1493 dosage, 788, 1493 chlorination and; 945

ammonia and, 788, 963, 1493 pre-, 788, 1493 super-; 770

and activated carbon, 775

copper sulfate and; 1256 and increased chlorine dosage, 922 dead ends and, 953

Fragilaria and, 963 permanganate and, 1806

Spirogyra and, 963 Synura, fishy taste, permanga-

nate and, 948 Tabellaria and, permanganate and, 1618

mine water and, 616 oil and, activated carbon and, 465-6 permanganate and, 473, 781, 948, phenols and; 321, 471

activated carbon and, 461 sludge fermentation in basins and; 471, 957, 1493

activated carbon and, 1493, 1495 softened water, activated carbon and, 1495

see Carbon, activated; Chlorination. taste and odor; Dechlorination; Odor

Taxation; water supply and, 1099 Tees River; pollution, 313, 613, 1102 Teeth; mottled enamel, fluorine and, 463, 474

Temperature; in exposed pipeline, coating color and, 167

see Bacteria, iron; Bacterium ty-phosum; Chlorination; Chlorine absorption; Coagulation; Corrosiveness; Filtration; Katadyn; Mosquito; Purification, self; Soil; Water, ground

Terre Haute Water Company; intake, 150

Tetbury, Eng.; new borehole, 161 Texas; ground water; investigation, 760

survey, 1495 sewage disposal, data, 1497 water; bottled, sanitary control, 1497

supplies; data, 1497 State Dept. of Health and, 1493

Water Works Short School, 14th,

Texas and Pacific Railroad; cast iron pipeline, cement joints, 316 El Paso wells, sand trap and, 316 oil separator, 2047

water supply improvements, 2047 Texas-Louisiana Power and Light Co.; typhoid epidemic, claims and, compromise and, 151

Textile; water; characteristics, ideal, 1488

hardness and, 1488, 1620 softening for; 303 zeolite, 1488

Bleaching; Carpet; Cotton; Dyeing; Rayon; Wool

Thames River; oxygen dissolved data, 1619 Thioporphyra volutans; chemical

changes in pools containing, 916 Thiothrix; in slow sand filter effluent,

Thomasville, Ga.; administration and financing, 321 water softening plant and cost,

1808 - 9Tin; removal, base exchange and, 1102 Tokyo, Japan; sewerage and, 596 water supply, 596, 770 o-Tolidin; see Chlorine, free, deter-

mination

Topchanchi; filter clogging, 2037 Topeka, Kans.; reservoir construction, 776 Toro Dam; see Shawinigan Water and Power Co. Toronto, Ont.; elevated tank over old standpipe, 150 Trade waste; see Industrial waste Transpiration; 936, 1614 see Stream Treatment; 907 trends in, 2043 see Chlorination; Filtration; Iron removal; Purification; Softening; Sterilization; etc. Trench; in street, accident and, liability and, 1099 Trenching; drainage to adjacent property and, 163 width-depth relationship, 747 see Excavation Trier; water supply, dry periods and, 1087 Tujunga Water Co.; dam, Government lands and, 943 Tulsa, Okla.; algae, taste and odor and, chloramine and, 963 filter plant; new, 925, 963 operation cost, 926, 963 runs, microorganisms and, pre-chlorination and, 926 Spavinaw project contracts, 961 water supply, history, 961 Tunis; rubble dam, 1250 Tunnel; construction; 459, 583, 589, 590, 756, 1241, 1466 explosion; dynamite, unexploded, and, 294 natural gas and, 294 geophysical exploration and, 580 quicksand and, 294 in sand and gravel, prior chemical treatment and, 1615 ventilation and, 1248 water flows, large and, 294, 580 cost, 1248 lining; capacity increase and, 587 cast iron, 589 concrete; 459, 589, 756, 1102, 1241 blocks, precast, 589, 590 cost, 300 infiltration through, failure and, 294, 301 pneumatic placing, 590

gunite, 589

steel and concrete, 779
Turbidity; and bacteria, correlation,

filter; effluent and, limit, 470, 609,

influent and, 609, 1238 and gravimetric suspended matter determination, comparison of results, 604 see Coagulation; Suspended matter Turbidity determination; 919, 2045 apparatus; 1808 Baylis, 2043 candle type, 2043 floc detector, 609, 610, 1100, 1808. 2043 flocculated matter, centrifuging and, 610 methods, comparison of results, 953 standards, preparation, 1808, 2043 variations, photo-electric alarm and, 1465 see Sediment Turbine, water; propeller type, 936 Tweed River; pollution, 314 Typhoid; Chicago, 791, 1266 chlorination and, 320 Cincinnati, 457 Detroit, 2041 drought and, 465, 748, 782 East Chicago, 791 epidemics; 307 Cloverdale, Ind., 784 Hanover, Ger., 1618 Montreal, 1618 water-borne; 1095 contamination during distribution and, 158 damage suits and Olean, N. Y., 783 Eastport, Md., i individual wells and, 147 filtered water, contaminated with raw, Rio de Janeiro, 463 gastro-enteritis outbreak preceding, 158 ichfield Springs, Richfield Tex.. springs and, 152 suction line break at river crossing, Olean, N. 783 in United States and Canada, 1920-9, and causes, 1482 well, direct-connection to river, Gillam, Man., 298 filtration and, 1262 Ford, Mich., 2042 Great Lakes Region, 1265 Hammond, 791 Illinois, 780 Indiana Harbor, 791 Kansas City, Kans., 1100 Manila, P. I., 585 Maryland, 1103

U

U

Massachusetts, 780 Michigan, 2041 New Jersey, 764 Ohio, 457 Pennsylvania, 782 Pittsburgh, 157 water-borne; 1475 damage suits and, 151 liability and, 1482 water purification and, 1097, 1255, West Virginia, 783 Whiting, 791 see Water quality

atter

of re-

atter

1808,

ging

. 953

2043

arm

36

dis-

sts,

ual

ted

ro,

ak

x.,

Y.,

la,

to

15

Ultra-violet ray; bactericidal action, sterilization; 935, 1096 cost, 1096 eosin and fluorescein and, 1098 United States Bureau of Reclamation; arch dam analysis by trial loads, 746 Boulder Dam; height, increase and, 442 power contracts, 442 progress, 1465 earth dam materials, investigation, 743 Echo Dam, design and construc-tion, 1464 Gibson Dam, design and construction, 1464 Hoover Dam; concrete cooling system, 742

dure, 741 siphon design, 297 United States Bureau of Standards; pipe coating tests, 1084, 1085, 1094 United States Geological Survey; Columbia River gaging cable, 588 ground water surveys, 760

Owyhee Dam, foundation proce-

United States Navy; intestinal disease epidemic, 932

United States Public Health Service interstate carrier supplies and, 792 Upper Potomac River Board; and its accomplishments, 951, 1104 Upper Sandusky, O.; taste, activated carbon and, 957

Urbana, O.; wells, drought and, 1096 Uroglena; copper sulfate and, 770 Utah; ground water rights, 442

Utility; see Books

data, 742

Valparaiso, Ind.; new elevated tank,

Valuation; for rate making, 1495 see Books Valves; boxes, raising to grade, 157 butterfly; design, 1481 high head tests, 444 closing time, hammer and, 964 -inserting machine, 157 installation, 1497 materials, metallurgy of, 749 operation at intervals, advisability, sluice, electrically-operated, large, remote control, 147 testing, 317 see Cross-connection; Distribution system Van Wert, O.; new elevated tank, 156 Vancouver, B. C.; tunnel, proposed, 1102 8ee Greater Vancouver Water

District Venturi meter; 586, 934, 963 large, calibration, 750, 751 new type operating at low head, 1471

two in parallel for varying flows, 300 Verdunization; see Chlorination Vessel, navigating; ballast water, chlorination and, 1096

Vibrio; -cidal property of river waters, in India, 1804 Madras supply and, 789, 1260,

2049 Vibrio cholerae; detection in water, 1618

longevity in water; 785, 1618 Bodo saltans and, 785 protozoa and, 1806

Vienna, Austria; metering, consumption classification and, 1476 Virginia; chemical industry, 787

springs of, 1613 Water and Sewage Works Associa-tion, 3rd Conference, 787 water supplies; data, 782 drought and, 772

Voges-Proskauer test; see Bacteria, colon group

Wading pool; design, 460 new, 2037 water quality, factors, 1095

see Swimming pool Wall; retaining, costs, comparison, 298

Wallasey; washhouse and slipper baths, 2036

Walters, Okla.; new well, 962

Wanaque; see North Jersey Metropolitan District

Ware River; see Boston Warren, O.; filters, early, 956 taste, chlorination and; activated carbon and, 957 excess lime substitution and, 957 Wash house; public, 2036 Waste; metering, selective, and, 153 prevention, 306 survey, results, 157 see Leakage; Plumbing Water; use, most important, court decision and, 454 Water analysis; boiler methods and interpretation, 2046 of mineral water, results, expression of, 933 see Bacteriological examination; Books; Chlorine; Iodine; Microscopic examination; Oxygen dissolved; Turbidity; etc. Water, bottled; control; city and, 1494, 1497 state and, 1497 regulations, state, 764, 781 see Water, mineral Water cost; East Bay Municipal Utility District, 754 Metropolitan Water District of Southern California, Colorado supply, 591 Rand Water Board, 953 Water, gratuitous; 291, 1248 Pasadena, Cal., and, 295 Water ground; artesian balance, coast and, 777 artificial, underground irrigation and, 598 base exchange and, 1803 collecting system, 1613 compensation for withdrawal, 167 disease outbreaks and, 470 drought and, 299, 774, 1092, 1096, 1098, 2045 forests and, 449 geology and, 321, 448 increasing, purified river water to seepage basins and, 766 level; receding, 791 season and, 299 cating, geophysical exploration and, 938 locating, Ohio and, 473 origin, 448, 1615 physiography and, 321 pollution; abandoned wells and, sealing and, 783 drainage wells and; 471 sealing and, 783 hazards, 1496

septic tanks and, 459, 768

prospecting for; 1241 drilling methods, 163 quality, 448 rainfall and, 448, 449 replenishing, sewage reclamation and; 588 experiments and costs, 923 salinity, estimating, geophysical exploration and, 938 salt water and, hydrostatics, 321, streamflow and, 1242 supplies, proportion in United States, 471 surveys, 760, 1495 temperature and, 1105 yield, studies, 961 see Infiltration gallery; Springs; Water rights; Water supply; Wells Water hammer; 949, 950 causes, 964 formulas, 964 valve closing time and, 964 see Pipe Water measurement; devices, 586, 934 see Channel; Current meter; Flow; Level; Meter; Orifice; Pitometer; Venturi; Weir Water, mineral; analysis, expression of results, 933 bottled, control in United States, 164 quality in United States; 165 standards, 165 register and classification, international, 933, 1097 springs, protective legislation and, 601 see Water, bottled Water power; see Books; Canada; Hydro-electric Water quality; bacteria, significance, 469 B. aerogenes, significance, 154, 1496 B. coli; limit and, 758 significance, 470, 1475, 1480 chemical, factors, 618 chlorides, limit, taste and, 1246 copper, health and, 935 impure, liability and; 148, 1496 posting of notices and, 148 iodine content, classification re, 781 iron, limit and, 448 lead and, 612, 1479 legislation re, survey, 601 mineral content, health and, 913 raw water standards, 452 requirements, 780 sanitary survey and, necessity of, 1496

V

silver, health and, 305, 1103
standards; 620
France and, 2045
teeth, mottled enamel and, 463
turbidity, limit and, 470, 609,
616
zinc, limit and, 2040
see Arsenic; Disease; Lead; Pollution; Purification; Swimming
pool; Typhoid
Water rights; ground water and,
Utah, 442
impounded water and, 943
interstate controversies, 751, 752,

n

ı

931, 943
reasonable use and, 943
riparian, 1095
stream diversion and, 1095
Water sickness; outbreak of, 158
Water supply; 446
ancient, 1100

ancient, 1100
data, obtaining and filing, 1809
developments, 588, 607, 1251
drought and; 458, 465, 472, 608, 618.
748, 765, 771, 774, 781, 931, 935,
944, 1087, 1092, 1098, 1103, 1237,
1466, 1492, 1493

1466, 1492, 1493 shortage and, guarding against, 1483 transportation by rail and, 465

dual, impracticability, 1255 exhibits and, 933 extension, investigation and, 777 farm and, 458, 473 interruptions, major, classification,

949 interstate carriers and, U. S. P. H. S. and, 792

regional, 306, 468, 597, 921, 930, 1482 sewage reclamation and: 1245, 1256.

sewage reclamation and; 1245, 1256, 2045 cost and, 296, 923

repeating, number of times possible, 1246 sewage treatment and, 322, 790

sewage treatment and, 322, 790 small and scattered communities and, 306

sources; data, 581, 748, 755 ground vs. surface, 1105, 1255, 1486

mountain vs. purification, 753 pure vs. purification, 1496 stored, development, 447 supervision; city health dept. and, 1494

state and, 763, 781, 783, 791, 906, 963, 1103, 1486 volume required, 306

see Army; Books; Purification;

Treatment; Water works; Wells; etc.

Water supply, industrial; filter Wangner, and, 159 water quality and, 461 see Purification

Water tower; concrete, leakage, design and construction precautions and, 1251

control, automatic, 2036 new, 1807

Water unaccounted for; American Water Works and Electric Co., 145 Honolulu, 777 Milton, Mass., 949

Water Works; consumption, maximum, provision for, limit and, 1465 employees welfare, 321 improvements on private property,

law and, 454 inspection trips, complaints, minimizing and, 616

municipal, property outside corporation, aquisition of, 462 ownership data, 457 personnel developing 469

personnel, developing, 469 private; consumer relations, rules re, 931

purchases; by holding companies, decrease and, 930 by municipalities, increase

and, 930
public and private, functions, 462
regulations, legality, 162
sale by municipality, law and, 941
service; building, 1466

to outside communities, terms

and, 147
and repair shop, 1497
small, construction, 468
values, E. N.-R. index figures, 148

see Administration; Billing; Books; Contract; Emergency; Financing; Purification; Valuation; Water supply; Well; etc. Jaterbury, Conn.; administration

Waterbury, Conn.; administration and financing, 1248

Watershed; bathing and, 781, 946 chlorination of polluted streams and, 611

fishing and, 946 forestation; 468, 611, 925, 931 erosion and, 928, 955 pine and, 955 revenue and, 925, 955 runoff and, 928 spruce and, 925, 955 water quality and, 928

water quality and, 928 ice cutting and, 611 protection, 306, 611, 946

public access and, 306 recreational use, 611 Waukegan, Ill.; Aer-O-Mix and, 1494 Weddell Sea; plankton and, 606 Weir; measuring; 934 and recorders, 586, 769 triangular, calibration, 297 V-notch, in pipe, 747 Weiser; taste, superchlorination and activated carbon and, 775 Weiser, Idaho; filter plant, new, and cost, 921 Welbeck Colliery; water purification plant, 160 Welding; acetylene, explosions and, causes, 1470 arc; burning depth, significance, 1469 seq. electrode; covered, 1621 materials, titanium addition, 1621 strength and: 753 coatings and, 1085 see Books; Copper; Pipe, steel Well; 448 arsenic and; 1800 poisoning and, 307 artesian; deep, 950 flow, large, and, 150 flowing, abandoned, waste and, 1808 salt water contamination, safe pressure and, 150 world's greatest, 460 casing; shooting holes in, 298 troubles, 460 construction; 458, 473, 611 casing, driving, 460 development, compressed air and, 773 drilling; 456, 1808 tools, recovery, 460 under-reamer and, 774 gravel sterilization and, 760 deep; B. aerogenes and, significance, 1496 level lowering, excessive pumping and, 322 disease outbreaks and, 1496 drought and, 465, 472 filter pipes, split copper, 1807 gravel wall; advantages, 772 construction, 774, 962, 1614 yield, increased and, 1614 hot water, 778 hydrogen sulfide and, 786 incrusted, acid treatment and, 2044 irrigation use and, 144 in limestone, 459, 775

location, selection, 611

multiple development; collecting mains and, 926 siphon principle and, 586 new; 765 chlorination, 1476 pollution; 771 abandoned wells and; 1496 correcting, 161, 783 chlorination and, 612 during development, prevention. 448 drainage wells and, 1808 mine water and, 616 river connection, typhoid fever epidemic and, 298 pumping; 962 air lift; depth and, 315 efficiency, 1495 centrifugal turbines, efficiency, deep well pumps; marine oil engine driven, 937 selection, 2047 equipment, selection, 959, 1494 piston pumps, efficiency, 1495 into reservoir, low-level, 944 salting, 443, 1476, 1614 in sand and gravel, hydraulics of, sand trap, 316 sealing of lower section by chemical hardening, 926 shallow, disease outbreaks and, 471 specifications, drawdown, bonus and, formula, 155 typhoid outbreak and, 147 water; chlorination, universal, and, 1496 iron and, excessive pumping and, 1101 yield; guarantee, legality, 454 increasing; 457, 944 compressed air and, 773 rainfall and, 1092 see Oil well; Water ground Wellington, N. Z.; consumption, 162 water supply, 161 West Fork River; acidity, 465 mine waste pollution, 467 West Virginia; drought of 1930; stream flow and, 465 typhoid and intestinal disorders and, 465 water supplies and, 465, 772, 1098 northern, water supplies, manganese and, 467, 1253 sanitary code, 781 typhoid, 783 Water Purification Conference, 6th, 464

W

W

W

W

W

W

W

water supplies, data, 783 Westinghouse Lamp Co.; waste treatment, 1094

Weston, W. Va.; manganese, 467, 1253

White Plains, N. Y.; new reservoir,

ing

on,

rer

y,

oil

f,

al

18

ì,

ł,

2

Whiting, Ind.; typhoid, 791 Wibaux; flood, 755 Wichita Falls, Tex.; ammonia-chlorine treatment, 1494 Williamsport, Md.; metering, 1099

water supply, fire insurance rates and taxes and, 1099

Wilmington, Dela.; dam, new, 468

pollution survey, 467
water supply history, 467
Wilson Dam; spillway discharge capacity, 1083
Windson, Onto Version Control Windsor, Ont.; Kennedy Collegiate

swimming pool, 2036 Winnetka, Ill.; artificial turbidity

and, 144 Winslow, Ariz.; taste, algae and, copper sulfate and chlorine and, 922 Wisconsin; sanitary conditions and,

1265 sewage treatment and water purification, 790

Wise, Va.; iron removal, 782

Woodburn; sewage discharge, court decision re, 1488

Wool; washings, grease removal, 935

see Carpet; Textile

Worms; parasitic, water-borne disease and, 1475 in service pipes, 616

see Chironomus; Reservoir Writing; see Books Wuching, China; water supply, 1102 Wuppervale, Ger.; water supply, artificial lake and, 1093

Yallourn, Australia; water supply and purification, 598

Yokohama, Japan; sewerage and, 596

water supply, 596, 770 York, Pa.; watershed, reforestation, 925

Youngstown, O.; taste, activated carbon and, 957

Youngstown Sheet and Tube Co.; phenol recovery, 783

Yukon; hydrometric investigations, 951

Zeolite; composition, 159

exchange capacity; increasing, 303 and regenerative capacity, determining, 159 history of, 962

manufacture, 159 properties, 159

see Crystalite; Greensand; Iron removal; Manganese removal; Softening

Zine; corrosion; 314, 1804 protection, chromates and, 1254 determination, ferrocyanide titra-

tion, 2039

in water; permissible amount, 2040 removal, base exchange and, 935, 1102

see Pipe, galvanized